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The Journal OF THE AMERICAN DENTAL ASSOCIATION

Dental Education—*Gies*

Sugar and Dental Caries—*Jay*

Gold Foil Restoration—*Ellsperman*

Parodontosis—*Thoma and Goldman*

Dental Organizations in United States—*Bear*

Hydrocolloidal Impression Materials—*Paffenbarger*

Fractures of Maxillae and Mandible—*Logsdon*

Radiodontic Aspect of Diagnosis—*Lovett*

Porcelain Inlay Technic—*Smedley*

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MARCH 1940

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WANDERING AND ELONGATION OF THE TEETH, AND POCKET FORMATION IN PARODONTOSIS*

By KURT H. THOMA, D.M.D., and HENRY M. GOLDMAN, D.M.D., Boston, Mass.

PARODONTOSIS (diffuse atrophy of the supporting structures of the teeth), a disease of early and middle life, causes resorption of the alveolar bone, allowing the teeth to migrate and become loose. It should be carefully differentiated from marginal parodontitis.

CLINICAL FINDINGS

Migration of the maxillary incisors, an early characteristic, is accompanied by loosening of the teeth. Only the single-rooted teeth are displaced, since the multirooted ones offer sufficient resistance against displacement. The teeth may show mesial or distal as well as labial movement. Wandering is aggravated by the occlusal impact and it continues until the teeth can no longer be brought into contact with their antagonists. They may migrate, however, even though they are not in occlusion. In advanced cases, there is marked elongation, with protrusion and labioversion, and the cervical part of the root is exposed.

In the early stages, no pockets are present, nor are the gingivae affected. Only in the later stages do vertical pockets form. These are cone-shaped and are lined by a layer of epithelium, under which lies a large amount of granula-

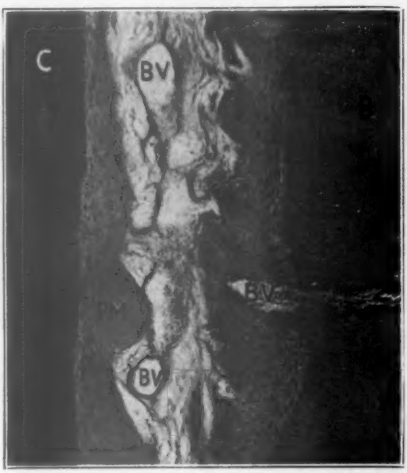


Fig. 1.—Section on the side of tooth showing marked enlargement of blood vessels in peridental membrane. A capillary can be seen lying in the bone. These are changes that take place in parodontosis. C, cementum. PM, peridental membrane. BV, blood vessel. B, bone.

*From the Department of Oral Pathology, Harvard University Dental School.

tion tissue. Percussion of the teeth gives a dull response because of the presence of the connective tissue that has replaced the alveolar bone.

ROENTGEN FINDINGS

X-ray examination discloses a general haziness of the bone, which can be recognized even in the early cases. Areas of rarefaction can be seen around the teeth. As the disease progresses, the haziness increases and the peridental space shows enlargement at the apex as well as the alveolar margin.

Fig. 2.—More advanced pathologic changes. (Compare Fig. 1.) There is vascular resorption of the alveolar bone with connective tissue filling in the defect. In this way, the peridental membrane becomes wider. D, dentin. C, cementum. PM, peridental membrane. BV, blood vessel. B, bone. CT, connective tissue.

HISTOPATHOLOGY

Changes in the Bone.—Bone changes are the earliest pathologic alterations in parodontosis. Bone is resorbed in a plane vertical to the alveolar margin. The resorption is accomplished by osteolysis (bone reversion) and vascular resorption. Osteolysis causes removal of the inorganic salts, so that, in advanced cases, trabeculae, which were formerly made up of mature bone, consist entirely of connective tissue. This connective tissue represents the bone matrix of the former osseous structure. (Fig. 3.) In vascular resorption, capillaries and blood vessels from the peridental membrane can be seen in contact with the bone. The latter is gradually removed, the defect being filled in by ingrowth of connective tissue from the surrounding structures.

Changes Affecting the Teeth.—The first evidence of this disease is resorption of the alveolar bone, which gives the socket a pitted appearance. This resorption causes a detachment of the principal fibers of the peridental membrane from

the alveolar bone. Thus, the function of these fibers is lost, and they also become detached from the tooth. Detachment of the peridental membrane may cause resorption of the tooth similar to that seen in the atrophy of disuse, which also causes a decrease of the principal fibers of the peridental membrane, with root resorption where the fibers have been lost.

Changes in the Peridental Membrane.—In uncomplicated parodontosis, this structure is always free from inflammation. When pockets are present, cellular infiltration extends only as far as the pockets. The peridental membrane, however, shows marked dilation of the blood vessels and proliferation of the capillaries. It is the increase of capillaries which causes resorption of the alveolar bone and the loss of attachment of the principal fibers of the peridental membrane to the bone and cementum. Microscopic studies show that these fibers become detached at the bone, while they maintain the attachments to the cementum. (Fig. 5.) This state, however, is temporary, since the attachment to the cementum will be lost later, owing to loss of function.

Pocket Formation.—Pocket formation is of the vertical type because the bone is resorbed in a vertical plane, and, as a result, the peridental membrane becomes wider. At the same time, epithelial proliferation is progressing rootwise along the cementum. This proliferation is probably due to the loss of attachment of the principal fibers of the peridental membrane, especially the free gingival, the transseptal and the alveolar crest fibers. While these fibers are intact, the epithelium lining the crevice does not proliferate along the cementum, there being a cellular balance between the epithelium and the principal fibers attached to the tooth, to prevent a downward proliferation of the epithelium.

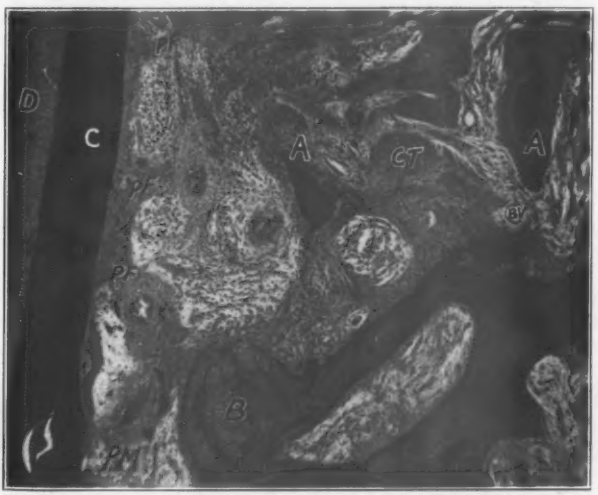


Fig. 3.—Section taken at alveolar crest showing changes that take place later in parodontosis. Marked bone resorption has taken place by osteolysis and vascular resorption. At A, osteolysis is going on. The center of the trabecula is bone, and surrounding this is the connective tissue matrix of the former bone. At B, the principal fibers have lost their attachment to the bone, but are still attached to the cementum. This attachment will be lost later. D, dentin. C, cementum. B, bone. PM, peridental membrane. PF, principal fiber. CT, connective tissue. BV, blood vessel.

Fig. 4.—Section in parodontosis showing granulation tissue forming at apical portion. This proliferation of tissue pushes the tooth. D, dentin. C, cementum. B, bone. CT, connective tissue. M, marrow.

Fig. 5.—High-power photomicrograph; par odontosis showing proliferation of connective tissue in peridental membrane which pushes tooth. D, dentin. C, cementum. PM, peri-dental membrane. CT, connective tissue. B, bone.

Fig. 6.—Fibroblastic activity of connective tissue. (Section of Figure 5.)

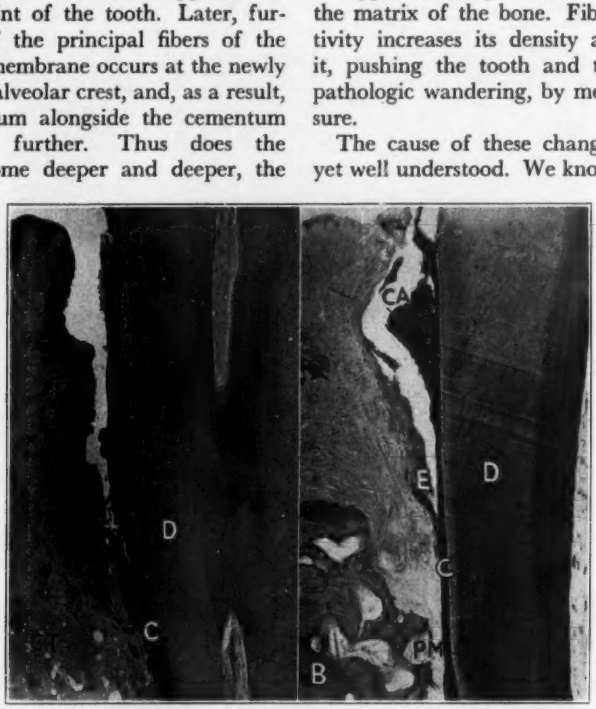
Once the attachment of the transseptal and alveolar crest fibers to the bone is lost, the free gingival fibers relax. The function of the former is upset, since the alveolar bone has been resorbed, and because their attachment has been lost. This results in loss of attachment to the cementum. This breakdown allows the epithelium to proliferate downward along the cementum from which the peridental membrane has been detached. Then a detachment of the epithelium from the cementum takes place, causing development of the vertical pocket. Therefore, the variability in the form and depth of the pocket in parodontosis is dependent on the breakdown of the principal fibers and the extent of the proliferation of the epithelium.

After pockets have been established, marginal changes, due to infection and food impaction in the pockets, result. A reaction is seen in the gingival corium similar to that found in marginal parodontitis, causing the loss of the crest of the alveolar bone by lacunar resorption.

A B

Fig. 7.—Two microscopic sections showing pocket formation in parodontosis. In A, the epithelium has proliferated along the cementum. There is complete destruction of the principal fibers of the connective tissue, allowing for this proliferation. The epithelium is still attached to the cementum. Later, this will separate and a vertical pocket will form to point A, as designated. In B, a vertical pocket has already formed and débris can be seen lying in the crevice. D, dentin. C, cementum. B, bone. E, epithelium. PM, peridental membrane.

Once the crest is lost, the clinical crown becomes greater in proportion to the clinical root, and occlusal factors enter the picture. Even normal occlusion will cause lateral stress and, under such conditions, the bone will become resorbed faster at the crest and apical regions. It is affected least in the area opposite the fulcrum point of the tooth. Later, further loss of the principal fibers of the peridental membrane occurs at the newly established alveolar crest, and, as a result, the epithelium alongside the cementum proliferates further. Thus does the pocket become deeper and deeper, the process continuing as the fulcrum of the tooth travels apically. (Fig. 9.)



A B

Fig. 8.—Vertical pockets in parodontosis. A shows marked proliferation of epithelium lining the vertical pocket. The connective tissue has replaced the alveolar bone. B is a section of a vertical pocket with calculus in it. As stated in the text, the alveolar crest is widened more than at the fulcrum, which is at the bottom of the illustration. The epithelium can be seen proliferating along the cementum. D, dentin. C, cementum. PM, peridental membrane. B, bone. E, epithelium. CT, connective tissue. CA, calculus.

Pathologic Wandering of the Teeth.—Pathologic wandering is, as we have already stated, a distinctive symptom of parodontosis. The cause, according to our interpretation, is pressure resulting from the proliferation of connective tissue, replacing the resorbed bone. Where alveolar bone is being resorbed, dilated capillaries, filled with blood, are seen in the adjoining peridental membrane. The principal fibers are lost, and connective tissue fills in the space. From here, it grows into the space created by resorption of the bone. In other instances, it is supplied through bone reversion from the matrix of the bone. Fibroblastic activity increases its density and expands it, pushing the tooth and thus causing pathologic wandering, by means of pressure.

The cause of these changes is not as yet well understood. We know that, once they develop, occlusal conditions become very important in the progress of the disease. If the occlusal relationship is abnormal, the process goes on with greater rapidity. Abnormal occlusion will influence the direction in which the teeth migrate and determine the place where pockets may form. Once they have started to wander, the teeth will con-

tinue to do so even though they are pushed out of occlusal range, and therefore are not influenced any more by occlusal conditions. This is due to the continued connective tissue production going on in the peridental membrane and the adjoining bone.

Pathologic Elongation of the Teeth.—Elongation is thought to occur if connective tissue is formed around the entire circumference of the tooth, and especially if it forms at the apex or in the bifurcation of a multirooted tooth. In the first instance, the pressure is equal on all sides and will favor elongation of the tooth without migration. In the second instance, the force exerted is decidedly in a coronal direction, but it may be combined with wandering if connective tissue proliferation is confined to one side of the tooth.

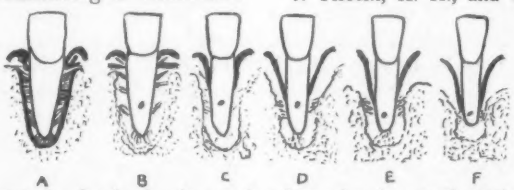


Fig. 9.—Diagrammatic sketch showing pocket formation in parodontosis. A, normal peridental membrane and normal alveolar bone. The crevice is shallow. B, first signs of parodontosis, in that alveolar bone becomes pitted by osteolysis or vascular resorption. There is an increased number of blood vessels in the peridental membrane. Some of the principal fibers have lost their attachment to the alveolar bone. C, transseptal and alveolar crest fibers, which have lost attachment to bone. The cellular balance between connective tissue fibers and epithelium is upset, the epithelium proliferating along the cementum. The alveolar bone is affected least in the area opposite the fulcrum of the tooth. D, separation of epithelium from cementum, forming vertical pocket. The principal fibers of the peridental membrane opposite the fulcrum point are still intact. E, alveolar crest attacked in manner similar to that in marginal parodontitis. The height of the alveolar bone is lost and thus the fulcrum of the tooth is moved apically. This causes further resorption at the alveolar crest, which will result in further loss of the principal fibers. F, further loss of principal fibers. The epithelium has proliferated along the cementum and separated from it, the pocket becoming deeper.

SUMMARY

1. The first evidence of parodontosis is a pitting of the alveolar bone.

2. The alveolar bone is resorbed by osteolysis and vascular resorption.

3. Pocket formation is due to a breakdown of the principal fibers of the peridental membrane, allowing the epithelium to proliferate along the cementum.

4. This breakdown of the principal fibers is due to resorption of the alveolar bone, which causes the loss of their attachment.

5. Pathologic wandering is due to proliferation of connective tissue, which either replaces the resorbed bone or forms the matrix of the former bone. This proliferation of tissue pushes the tooth.

6. If the proliferation of connective tissue takes place completely around the tooth, it will become elongated.

7. Occlusion will influence the direction in which the teeth migrate and determine where the pockets form.

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25 Shattuck Street.

REFINEMENT OF THE GOLD FOIL RESTORATION

By George A. Ellsperman, D.D.S., F.A.C.D., Bellingham, Wash.

Be not the first by whom the new is tried
Nor yet the last to lay the old aside.

THIS quotation is apropos in consideration of many of the principles of procedure and accomplishments in operative dentistry. Our application and use of proved technic, proved analysis, proved procedure, proved materials, does not mean that there should not be a gradual evolution or change toward standardizing, simplifying and general refinement of these things.

This paper will treat of refinement and standardization in operative procedures, with emphasis on gold foil operations. It will treat of the use of the rubber dam and instruments, including clamps, separators and cutting instruments and their manner of application, together with general procedure. It will also treat of the refinement of the different classes of gold foil fillings, illustrating outline forms, which, of the whole subject, I believe to be the most important part.

Some may question the authority for these statements and those to come. I must mention G. V. Black, who gave us the original operative technic; and I might name several other men who have since been inspired and have inspired others to fine operative procedure and who are the authority for some of the thoughts expressed here.

However, these refinements have, to a great extent, come from the genius and unyielding disposition of one man, W. I. Ferrier. My next and last authority, in which I have the utmost confidence, is "Nothing succeeds like success." In other words, the use in my hands and in the hands of many men has proved over the years the worth and desirability of these procedures.

It would not be fair to you in the operative section, you who have elected to place special emphasis on the saving of the human tooth; you who recognize the superiority of the vital, healthy tooth structure over any kind of material that may be used to replace it; you, too, who appreciate the health and beauty and cleanliness of those mouths treated with fine operative practice and who are often maligned by men who attempt to justify their own shortcomings or, let us say, their limited ability to practice the art of fine operative dentistry, if I did not encourage you. We have been told that dentistry is suffering from our narrowness of vision. We have become tooth mechanics, they say, and we are not placing sufficient value on dentistry as a branch of medicine. They would place major emphasis on nutrition, the chemistry of the mouth, foods, dietetics and miscellaneous theories of doubtful value.

I predict, however, that operative dentists will continue to place their values as in the past; that is, that the maintenance of oral health, comfort, function and prevention of dental disease will be, in the main, predicated on the treatment of initial caries with small permanent restorations such as gold foil. Surely, it has remained the one thing that we can rely on.

I could go on at great length to recite how the hope of all dentistry lies in fine operative procedures and their results.

Read before the Section on Operative Dentistry, Materia Medica and Therapeutics, at the Eighty-First Annual Session of the American Dental Association, Milwaukee, Wis., July 18, 1939.

It is not necessary for us to explain from time to time that what we taught last year is "out," that something else will be the proper and accepted thing. Operative dentists have taken two roads and, for the most part, they have chosen that right hand road of conservatism, involving the acceptance of proved principles, with which I shall mostly concern myself. However, I must in passing devote a paragraph to those who take the left hand road or "the short-cut route."

Short-cut methods will continue to come and go. Time-saving inferior technics will always be championed by some men whose opinions carry weight and receive consideration in operative dentistry. You must be the judge as to whether you will go to the right or to the left. Is operative dentistry served when the technic of the so-called slice preparation is used, resulting in the overcutting of valuable tooth structure? Great areas of enamel are overlaid with thin gold castings, with blue margins and etching of these enamel areas the result. The same can be said of a more recent trend, the excessive use of stones in cutting cavities. Some pseudo-operative men even short-cut the rubber dam procedure by placing one tooth under the dam. We see inferior materials as well as inferior procedures in common practice. The greatest breakdown of leadership occurred many years ago when a Judas (not a Moses) appeared leading the children of dentistry into the promised land. They could disregard the gold foil filling and the baked porcelain inlay for silicious cement. They could discard and disregard, in the interest of temporary esthetics and short-cut methods, fine operative procedure, fine cavity preparations and beautiful restorations. Silicious cements are still porcelain fillings to those operators and are still in vogue.

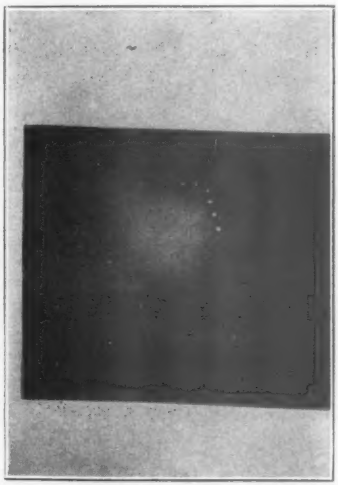

Fig. 1.—Rubber dam punched properly from central incisor to first molar.

Fig. 2.—Proper punching for six lower teeth from central incisor to first molar.

In regard to the overcutting of tooth structure, I wish to offer the following word of warning. I am not unduly impressed by the work and study of those who have gone far into functional relationships of the jaws in their attempt to produce a masticating machine with correct excursions. I do not wish to minimize the excellent contributions made in this field, but I am not losing sight of

many of the results of extensive reconstruction after a few years. That very obvious picture shows the loss of many more teeth, with the wearing of full dentures hastened, by poor operative procedures, improper regard of the value of tooth structure, incorrect cavity preparation and lack of proper instrumentation, than are ever lost by poor functional relationship.

While I have gone somewhat afield in discussing general operative problems, my purpose has been to bring out more objectively the gold foil operations.

It is noteworthy that the efforts of the men who have refined and standardized the gold foil restoration through the doldrums of the last few years are meeting with astonishing interest on every hand today. Conservative operative dentists are, by precept, example and repetition, given the vision in standardized procedure. The rubber dam technic is the same, time after time, requiring one, two or three minutes at the most. The clamps, rubber dam and cervical, are so standardized that almost no thought is required in selection on the operator's part. The selection and use of the separator becomes an automatic process. The blocking of the separator and the cervical clamp with compound is a definite and uniform procedure in similar classifications every time. Procedure and instrumentation of the cavity and the proper use of cutting instruments assume a definiteness, producing similar cavities in a comparatively short time. This gives us much in refinement of outline, in conservative cutting of tooth structure, in improvement of access and in other refinements, yet violates no principles of Black's cavity preparation. This picture of the gold foil operation is completed with the malleting and the finishing, accomplished with the same degree of standardization of procedure and instrumentation as that used in the cavity preparation. I wish that I could take the resulting gold foil restoration and make clear its full value, its beauty, its harmony of outline, its preventive features

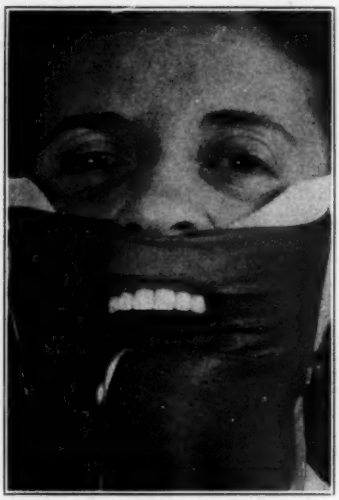

Fig. 3.—Correct application of rubber dam. The holes for the six anterior teeth are punched in an arc. The length of the jaws of the punch indicate the distance in from the edge of the dam for the first hole.

Fig. 4.—Correct application of rubber dam.

and its contribution to the art of operative technic.

All operative procedures should begin with team work or coordination of effort between the operator and his nurse. A fine nurse, properly trained, is indispensable during the entire operation. She does almost as much work as the operator and should feel a pride of accomplishment in team work that has a beautiful result.

THE RUBBER DAM

At the beginning of the operation, the operator is provided, on the bracket table, with a rubber dam and punch, a piece of

Fig. 5.—Class 5 cavity with tooth tipped to show incisal line and point angles.

ligature and the clamp and instruments necessary for the class and location of the cavity to be operated upon. A 6-inch square rubber dam should be used for all operations with the exception of the six anterior teeth, where a dam 6 by 5 inches may be used. There is nothing in operative procedure that should be more definitely standardized than the rubber dam. For cavities occurring in the six anterior teeth, the dam should be applied from cuspid to cuspid, and where the cuspid is to be operated upon, the dam should be carried to the first bicuspid. For cavities occurring in the posterior teeth, the dam should include the central incisor to and including the first molar on that side and, should the first molar require the operation, the dam should be carried to the tooth distally from it. When the rubber dam is started through the teeth, one lip of the punch must precede the other so that it will slip through without tearing. The nurse holds one side of the dam while the operator slips the rubber through a few key teeth. A soft muslin pad is placed over the face, the rubber dam being threaded through it, and is fastened with a suitable holder. With the

Fig. 6.—Soft foil cylinders in position.

aid of the ligature, the dam is gently forced through the remaining contact points. It must be stated that never is it necessary to ligate the teeth or to tie the dam on with ligatures. A dam properly applied should never in any way damage gingival tissues. With the lips held back out of the way of all operative trauma and with the jaws supported, the dam should be a comfort and an aid to the patient. A saliva ejector should also be used.

CLASS 5 CAVITIES

Class 5 cavities, i.e. those occurring in the gingival third of labial and buccal surfaces of the teeth, are carious or erosive in origin. (Figs. 1-4.) The gingival portion of this cavity, in by far the greater number of cases, lies in cementum. I cannot stress too much the importance and value of the Class 5 gold foil filling. Rarely indeed is it ever objectionable from the esthetic point of view. Fine practice, too, offers much in refinement in this class, resulting in a filling which gives harmony and beauty of outline and finished form. It also offers the utmost in immunity to future decay or erosion and yet lends itself to a definite standardized technic.

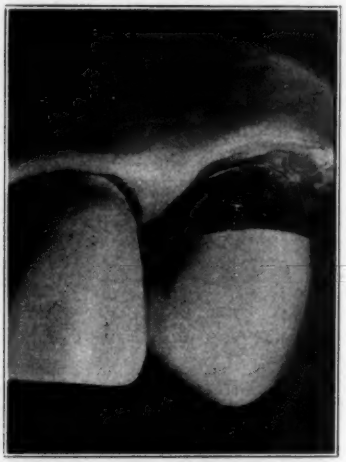

Fig. 7.—Finished foil filling.

The gingival clamp used is a Ferrier clamp, which is designed to give greater access to the cavity than other gingival clamps. The bows have good width and lie closer to the teeth. The labial jaw takes a direction more gingivally, thereby opening up a much better field in which to work.

PREPARATION OF CAVITY

The cavity is outlined with a 33½ inverted cone bur, held at right angles to the wall to be cut, and making definite gingival, mesial and distal walls. The side of the bur may be used to outline the occlusal or incisal wall. The cavity is, from this point, carried to completion with two hoes: one 0.65 mm. wide, the other 1 mm. Figure 5 shows a cavity that conforms to the outline of the caries or erosion area. The gingival, mesial and distal walls will be covered by the gingiva, the guide for the outline. The mesial and distal walls flare away from the axial wall, providing strength. The occlusal and gingival walls afford retention by being slightly undercut. The interior line angles and point angles are sharp. In the instrumentation of this cavity, the interior and the outline are established at the same time; in other words, each stroke of the hoe makes a clean cut of the wall from the axial to the cavosurface angle. The axial wall will be convex mesiodistally in order to keep a conservative depth throughout.

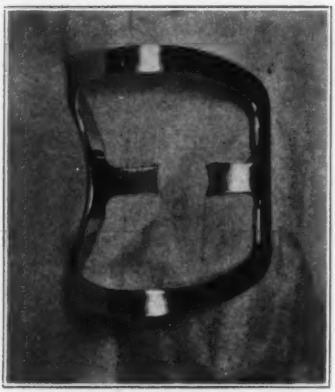

Fig. 8.—Ferrier gingival clamp.

The ease of instrumentation is in direct ratio to the character of the instruments used. The hoes I have spoken of and the cutting instruments that I shall mention later Dr. Ferrier redesigned from and refined over those of the Black

set. They must be of uniform thickness and width at the cutting edge as well as of a definite length of blade. The hoes must have three sharp cutting edges. The blade itself must have definite thickness at the shank, to eliminate spring, and yet not be too thick for delicate, effective work. No one searching for refinement in cavity preparation or wishing to save time can afford to be without several replacements in hoes, chisels and angle formers. Constant sharpening will soon wear a blade to a point beyond usefulness. Not more than 2 mm. of the cutting end of the instrument is of the proper hardness and thickness; yet fine preparations are impossible without constant use of an Arkansas stone.

Fig. 9.—Ferrier gingival clamp applied and blocked.

APPLICATION OF FOIL

A combination of cohesive and non-cohesive gold foil is used in filling the Class 5 cavity. Cylinders of one-sixteenth or one-eighth of a sheet of No. 4 gold foil are used to line the walls of the cavity. Figure 6 shows these cylinders in place. The cylinder is placed against the wall, then held and compressed by the soft foil parallelogram condensers. Cohesive foil is next placed against the axial wall in the center of the cavity and carried out with the line of force toward each of the walls. Excess non-cohesive foil is pinched off over the cavosurface angles. The finishing involves the use of sharp files, which are pulled toward the margins until the original tooth form is restored. Great care must be exercised in finishing joints lying in cementum. Even the men most skilled in these procedures hesitate to use sandpaper disks if there is any chance of damage to this soft tooth structure. The filling is finely polished with dry pumice and chalk.

I cannot stress too much the value, in the average dental practice, of this comparatively simple, yet exacting operation.

Fig. 10.—Labial outline for Class 3 foil cavity. There is a rather abrupt curve at the incisal aspect and the straight outline parallels the lobe.

Its urgent need is evident in almost every patient. This may be the result of gingival caries or of erosion in overkept mouths. In this classification of cavity, surely the clinical picture is every day presented to us of the failure of inferior procedures. Cast gold inlays and silicates with bad joints everywhere should be sufficient to give us a strong urge to refine our own procedures along this line. Figures 5 to 9 show many steps in Class 5 procedure.

CLASS 3 CAVITIES

Class 3 cavities are those occurring in the approximal surfaces of incisors and

cuspids. With many outline forms, the Class 3 form has justifiably received much criticism from the standpoint of esthetics. However, the refinement in what we might term the modern outline, as I shall illustrate, gives such harmony of filling and tooth that the restoration is astonishingly inconspicuous. In other words, the labial outline presents the appearance of a rather gradual curve at the incisal third; the gingival two-thirds, a straight line paralleling the lobe of the tooth and terminating at the gingival cavosurface angle placed beneath the free margin of the gum. The advantages of this labial outline are (1) a harmonious life-like effect and (2) a labial approach

Fig. 11.—Lingual outline. The lateral incisor gives an excellent picture of the linguogingival shoulder.

of equal extension from gingival to incisal aspect for the building of gold.

The procedure for instrumentation of the Class 3 form is as follows: The cavity is roughly opened with a small reverse bevel Wedelstaedt chisel. Following this, a 33½ inverted cone bur establishes the gingival wall, together with the linguogingival shoulder, which is the extension of the gingival wall to the lingual aspect. This shoulder will terminate the lingual outline. The gingival wall is laid straight across the gingiva and just beneath the free margin of the gum, or where that normally should be. The labial and lingual outlines are then finished with a gradual curve at the incisal aspect and the remaining outline extended as a straight line paralleling the lobe of the tooth. The interior form is cut with the small hoe and angle formers. The finished interior presents definite lingual, gingival and labial walls with sharp line and point angles. The bulk of dentin lying under the labial wall is cut out with the small hoe, using the sides as well as the end of the blade. This brings the labio-axial line angle well out

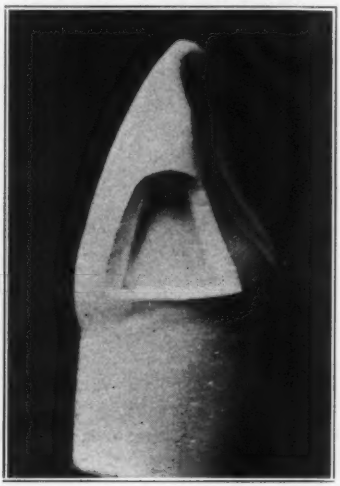

Fig. 12.—Interior of Class 3 preparation. The tooth is tipped to show the gingival wall and line and point angles.

labially and provides for a labial approach into the cavity. The incisal angle is cut retentively with a small right angle hatchet. The gingival wall is finished with a slope gingivally and the retention of the cavity is between the gingival wall and the incisal angle. The labial and lingual walls actually form obtuse angles with the axial wall.

The malleting of the gold begins with the condensing of small pellets into the linguo-axiogingival point angle, this being

carried out across the gingival wall and into this angle. Then gold is malleted over the linguogingival shoulder. The gold is built from the labial portion up until it reaches the incisal angle, when the separator is placed and blocked with compound. The malleting of the gold is then completed and the filling is finished to form with files, knives and strips.

I cannot leave the Class 3 gold foil filling without discussing its perfect indication, i.e., in the distal surface of upper cuspids. This area seems to be quite susceptible to caries, and, unless correctly restored, is very susceptible to recurring caries. Here, certainly, no objection could ever be offered to gold foil from an esthetic point of view. Clinical observations of all restorations of distal surfaces of cuspids show conclusively that gold foil is by far the most effective filling material for preserving this valuable tooth.

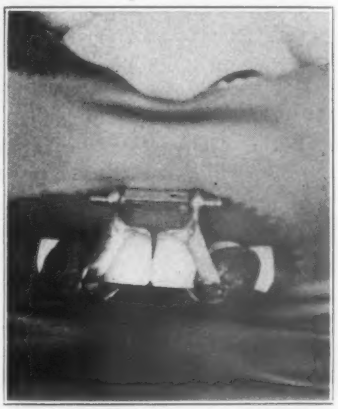

Fig. 13.—Ferrier No. 1 separator blocked to place. Considerable advantage can be obtained in access over the Perry Black separator.

The shape of the tooth permits a straight outline form, the distal angle of the tooth being cut away. In this way, all cavosurface angles are in the clear and, with the interior form, as just discussed, we have the labial, lingual and incisal approach in malleting foil. Figures 10 to 14 show Class 3 cavities, outlines and finished restorations.

Lastly, I shall discuss the Class 2 form of cavities, or those occurring in the proximal surfaces of the bicuspids and molars. I have repeatedly mentioned the value of the human tooth over any material used to replace it. I further state that in all initial Class 2 cavities, the use of foil in a cavity of correct design saves a great amount of tooth structure over that necessary for a correctly designed cast gold inlay. This paper and these illustrations would be much more valuable if it were possible for me to convincingly portray to you the all important fact that, given initial decay with the marginal ridge unimpaired, but where caries is present, necessitating the filling of the tooth, considerable tooth structure is saved with the gold foil filling as compared with the cast gold inlay. I have made many experiments on plaster teeth in cavity preparations for each, endeavoring not to overcut the inlay cavities, carrying them gingivally under the free

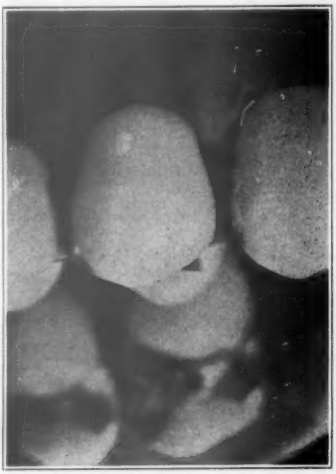

Fig. 14.—Cuspid with Class 3 foil filling in service for twelve years. The pull from the rubber dam has exposed the gingival joint, which is ordinarily covered. The labial outline is straight.

margin and buccally and lingually far enough to make acceptable, conservative extension. The step portion was likewise cut in conformity. It was interesting to note that the approximate ratio of the inlay cavity to the foil cavity in area was 1.75:1. The problem admits of little argument if one is familiar with the outline form and general preparation of the modern Class 2 gold foil cavity.

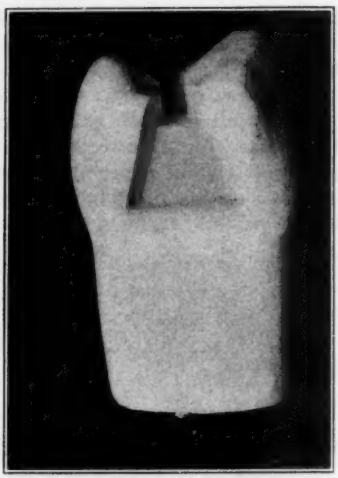

Fig. 15.—Class 2 cavity preparation.

Assuming the foregoing statements to be correct, let us consider the great esthetic advantages accruing. The upper bicuspids, in many mouths, are very noticeable. An accurate and conservative cutting of buccal and lingual walls sufficient to draw a wax pattern will produce a line of gold on the buccal aspect that, in certain types of teeth, might be quite objectionable; whereas the outline of the foil cavity, if viewed from its most favorable angle, would show a buccal clearance of not more than 0.5 mm.

The instrumentation consists of cutting through the marginal ridge with a small bur. The proximal portion is worked out roughly with a small fissure bur, and this is followed by the establishing of the outline and interior form with No. 10 width hoes or enamel hatchets. The same planing strokes that establish the buccal and lingual walls make the outline. The step portion is extended across the occlusal surface, taking in the groove with a small inverted cone bur, and this is finished with a No. 10 width hoe. In the majority of Class 2 cavities, the width of the step will be the width of the hoe. In viewing this cavity from the proximal aspect, the width across the gingival portion is much greater than across the occlusal. The buccogingival and linguogingival angles are definitely acute, the latter more so than the former. The occlusal approach is conservative indeed.

Fig. 16.—Outline clearance in relation to adjacent teeth; Class 2 cavity preparation.

This conservative preparation should assure a minimum of further impairment. Forces of attrition can mean little to a step portion but 1 mm. in width and a remaining occlusal portion of small area.

The filling of this cavity consists of placing and condensing in the proximal portion of three soft foil cylinders, which should fill the cavity level with the step. The soft foil is condensed by forcing the mass to place with a large condenser followed by a smaller one, using a fairly heavy malleting force. This, in turn, is replaced with a smaller plugger 0.5 or 0.6 mm. in diameter, with continuous stepping and malleting. Next, cohesive foil is placed in the point angles of the step portion and carried back over the soft foil, and the entire foil built to form. The proximal foil is then swaged, the excess removed and the separator applied and the gingival and proximal portions are finished. Knives, files and strips are used for this. The separator is then removed and the entire filling finished and polished to correct occlusal form. Figures 15, 16, 17 and 18 show Class 2 cavities and outlines.

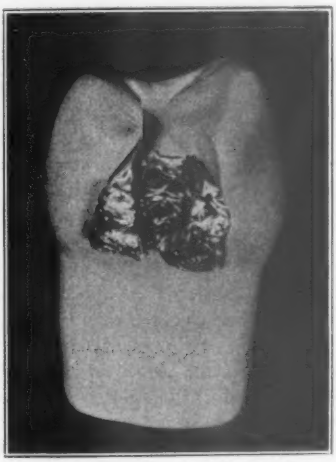

Fig. 17.—Placing of non-cohesive cylinders in proximal portion.

Fig. 18.—Finished foil filling. These should be studied from the standpoint of saving tooth structure.

To cover so comprehensive a subject in a short paper is, of course, not possible. Many facts have been omitted. For instance, little or nothing has been said regarding correct lines of force for condensers or the stepping of these. Nor have I explained the methods of malleting gold foil. However, at this point, I must mention one fine new addition to gold foil procedures. For those who do not have a nurse who has developed a fine uniform cadence of malleting, Dr. Hollenback's pneumatic mallet is far better than any other such instrument. The contra-angle handpiece of this instrument makes it especially adaptable to the malleting of gold in otherwise inaccessible positions.

CONCLUSION

This paper has been somewhat critical. Some of my criticisms have been directed at various practices and influences allied with dentistry. Some practices that I have mentioned have great merit, and all of us should seek to know and apply these newer theories accompanying the advancement of dentistry. At the same time, we must be vigilant in order that nothing shall act as a "red herring drawn across the trail" of the most important feature of our profession; that is, fine operative procedure and its accomplishment.

A PRACTICAL PORCELAIN INLAY TECHNIC FOR THE AVERAGE OPERATOR

By WILLIAM P. SMEDLEY, D.D.S., F.A.C.D., Denver, Colo.

TO all the excellent papers that have been presented at dental meetings extolling the virtues of porcelain, and the wealth of valuable information on every phase of dental porcelain available in the literature, it seems presumptuous to attempt to add anything of value. However, as long as such a small fraction of capable dentists are making porcelain inlays, it seems that missionary work is still needed and justified, for where esthetics is a consideration, and there are few cases where it should not be, there is still no satisfactory substitute for baked porcelain for most cervical and many proximal cavities in the six anterior teeth and many cervical cavities in the bicuspids. Quite frequently, its use is justified in mesioclusal cavities in the upper bicuspids and first molars and occlusal cavities in the lower bicuspids and molars. In Class 4 cavities, where the stress is apt to be too great for porcelain, good results can be achieved by making a labial porcelain inlay to conceal a well-anchored gold inlay.

Any skilful dentist, provided he possess good color sense, can become a good porcelain operator without the expenditure of an unreasonable amount of time and effort, and the pleasure and satisfaction derived from restoring teeth to a normal appearance with reasonable permanency will more than compensate for the effort required. Satisfactory results, of course, are hard to achieve by remote control, for it is quite impractical to successfully convey to even the most skilful technician all of the essentials of shade, contour, etc. It is the aim of this paper to show how the busy operator can do his own porcelain work, from cavity preparation to the finished product, without seriously interfering with his other activities.

One essential is to have a working place conveniently located, but sufficiently out of the way of everything else that it can be left undisturbed at all times and ready for the dentist to carry on the work at any, even though brief, interval that may present itself. (Fig. 1.) With a definite and well-planned procedure, the time at the porcelain bench may afford a period of relaxation from the chair work instead of being an ordeal.

There is no point in stating at this time the composition and preparation of dental porcelain. It is sufficient for us to know that the various manufacturers, after exhaustive research and experimentation, are prepared to furnish us with satisfactory material; it remains for us, through painstaking trial, to become skilled in selection, manipulation and baking. The medium-fusing porcelain is well adapted for most inlays and the low-fusing can be used for minor final changes of form even after the removal of the platinum matrix. Where the inlay is to be subjected to much stress, however, the high-fusing porcelain may well be used, and it must be used where incisal translucency is to be produced by the addition of translucent porcelain.

Read before the Section on Operative Dentistry, Materia Medica and Therapeutics at the Eighty-First Annual Session of the American Dental Association, Milwaukee, Wis., July 19, 1939.

In cavity preparation for porcelain inlays, some modification of the ideal and well-established plan for the gold foil filling and gold inlay must necessarily be made, owing to the friable nature of the material. Every effort should, of course, be made to avoid leaving short enamel rods, especially where exposed to the stresses of mastication, but it is equally important to avoid thin porcelain margins in these areas. They should also be avoided on the labial surfaces, from the standpoint of appearance, because of light refraction. Most proximal inlays in the upper anterior teeth should be inserted from the lingual aspect and as much as possible of the labial wall be retained to resist the forward thrust of the lower teeth. In the lower anterior teeth, where any portion of the incisal edge is involved, the lingual wall is needed for support. The labial margin of porcelain inlay preparation should be as nearly in line with the long axis of the tooth as the case permits and sharp angles be carefully avoided. Reverse curves, such as are produced by the incisal step preparation, are always unsightly and also make the close adaptation of the porcelain to the enamel in all places quite impossible.

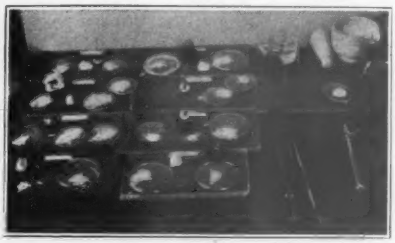

Fig. 1.—Work bench with cases in progress.

While the indirect procedure for matrix fitting is preferable in some respects, the operator should become thoroughly skilled in the direct method, which offers distinct advantages, especially in Class 3 and 4 cavities. Each step that is eliminated reduces the chance for error, and where time is a consideration, the direct method offers a further advantage. It is possible in Class 3 cavities, by preoperative separation, to accurately fit and remove a platinum matrix without radical cutting of either labial or lingual wall; whereas it would not be possible to take an impression by the indirect technic.

The steps in adapting the platinum matrix in the mouth are too well standardized to call for detailed repetition here: carrying the platinum into the depth of the cavity with a piece of spunk or a moist pellet of cotton; then, with it wedged firmly in the base of the cavity, carefully teasing out inevitable folds and reflecting the overlap upon the labial and lingual surfaces; next, with the cotton removed and the matrix held in place with a strip of rubber dam or tape, bur-

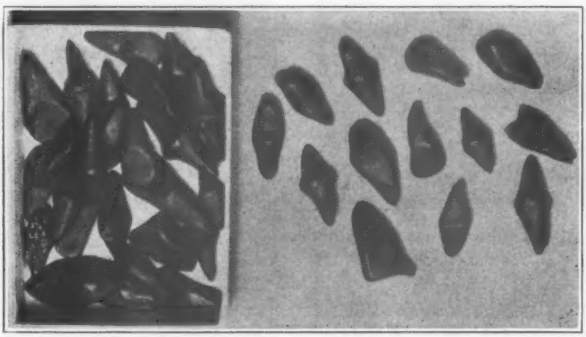

Fig. 2.—Compound forms for indirect impressions.

nishing until an accurate adaptation is secured. The one point that perhaps needs to be especially stressed is the importance of frequent annealing of the platinum during the procedure. This is emphasized because some operators seem to have the strange notion that annealing is in some way injurious to platinum. After the matrix is satisfactorily adapted, slightly warmed base-plate wax is pressed into it to give it greater stability during the final removal and to bridge the gaps that have probably developed in the base of the platinum. This serves also to prevent the investment from running through these holes in the platinum.

For indirect impressions, it is well to have on hand an assortment of black modeling compound forms shaped at the tip to approximate any probable cavity, the other end being shaped for a convenient finger hold. (Fig. 2.) With these forms, impressions can be quickly and easily made of most cervical cavities and certain proximal ones. For some cervical cavities, where it is difficult to carry the compound under the gum margin, and for cavities of irregular shape and perhaps extending unusually far mesially or distally, or both, it is well to use a well-fitted metal tray. Such a tray can be readily made by uniting two disks of 30-gage wax with a short wax rod, and casting with copper. (Fig. 3.) These can be easily bent and trimmed to the desired forms and kept for future use. This type of matrix is especially useful for full labial or buccal porcelain inlays in cast gold crowns and overlays. Before the impression is taken, the cavity should be thoroughly cleaned and dried and the tubuli sealed with varnish. S. T.-37, with its glycerine base, when applied to the area affords a better lubricant than saliva and helps to avoid irritation of the gingival margin of the gum.

Models made by the copper deposit method are superior to those of amalgam or cement. These are backed with artificial stone on a latex rubber mold to provide a uniform base, which insures their fitting accurately in a metal socket anchored in a convenient location at the porcelain work bench. (Figs. 4-5.) The inlay die material recently offered by dental manufacturers bids fair to supplant all of these because of the ease of manipulation and the great saving of time it effects as compared to either amalgam or copper. With it, both impression and mold can be filled with one mix and the die be ready for use in a short time. With the model trimmed and thus firmly seated, both hands are free for manipulation of the platinum. The platinum may first be shaped over the end of a stick approx-

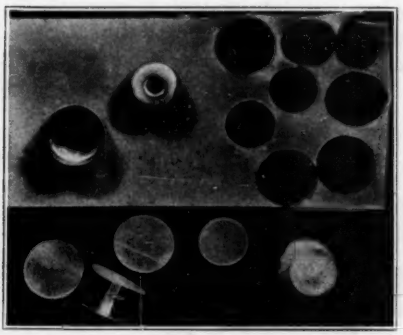

Fig. 3.—Detail of casting copper impression trays.

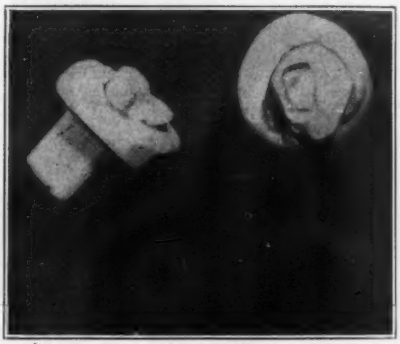

Fig. 4.—Latex mold for forming base for models.

imating the cavity in size and shape and then adapted pretty accurately in the mold and the folds worked out before flattening over the margins. For this preliminary adapting, ordinary wooden matches properly shaped and moistened serve nicely, the soft wood carrying the platinum to place with a minimum of injury. (Fig. 6.) The final burnishing is done with the usual instruments.

No objection is offered to the swaging method of adapting the platinum, but, perhaps on account of long use, the burnishing method is preferred, in the belief that in that way the folds in the platinum are better controlled. Again the importance of frequent annealing in stressed. The muffle, if heated, serves the purpose very well. Otherwise, an orthodontic blowpipe near at hand can be used. A matrix that is not thoroughly soft when the final fitting is made is bound to warp with the first firing, but, with an annealed matrix carefully invested, there need be no alarm about distortion, and the time required for, and the annoyance of, reswaging or reburnishing between bakings are avoided. Ample overlap of the platinum, not 1 mm. but several millimeters, is important to resist the pull of the shrinking porcelain if the baking is to be done without investing or to firmly hold the matrix in the investment when it is used. The matrix, when it is to be invested, should be filled with wax to bridge the tears in the base. These openings serve a useful purpose in properly condensing the porcelain, whether the investment is to supply the suction, which serves to condense the porcelain while drawing the excess water through the base of the matrix, or, in the uninvested matrix, the blotting paper or other absorbent medium provides the same force.

Fig. 5.—Drawer in porcelain work bench showing metal socket to hold model for burnishing matrix. Incidentally, the brushes, burnishers and carvers are shown.

Fig. 6.—Adapting platinum in anchored model.

In investing the larger inlays and full facings, it is well to place the investment in a band mounted in a matrix retainer in such a way that it may be readily released for firing and replaced for each porcelain packing. The matrix retainer serves as a convenient handle and provides a suitable base for vibrating the moist porcelain. (Fig. 7.)

The shade selection should be made after the cavity preparation is completed and before the temporary filling is inserted and at a time when the normal

shade of the tooth is not altered by partial desiccation. The porcelain selected should be noted on a small envelop, with the cavity outline drawn on a diagram of the tooth, and the desired shading, staining, etc., recorded. The model is filed in this envelop for possible future use. The shade guide must accurately represent the porcelain to be used. To have it do so, shade samples should be made from each jar of porcelain when obtained and the date marked on the jar; for the similarity of any two batches of the same number cannot be depended on, and the high, medium and low fusing of the same number are almost sure to vary markedly. These shade samples can readily be made by packing the porcelain in a latex rubber mold made from a properly carved plaster model and the porcelain accurately fired.

The selected porcelain body is placed upon a glass slab with the patient's name attached, and if anything at all unusual is planned, the envelop with instructions is placed underneath for reference. The porcelain, when not in actual use, is kept covered with an inverted watch crystal. (Fig. 8.)

In building, the bulk of the porcelain is usually placed with a spatula. In applying subsequent layers, a small brush is used to work the porcelain into the crevices and to put on the final layer. Much skill may be developed in the proper blending and overlapping of shades of porcelain and also in the use of stains to obtain the desired results. In making porcelain inlays to face gold inlays, overlays or crowns, and this is a favored use for porcelain, it is important to place a thin layer of semiopaque porcelain of proper dentin shade in the bottom of the matrix to prevent the dark casting gold from altering the shade. A distinct preference is felt for building accurately to the margin, thus avoiding grinding of the excess. Any excess that may have gone beyond the margin can, before firing, be carefully removed with a small, pointed and slightly moist brush, or with a small flat, stubby dry brush, or both.

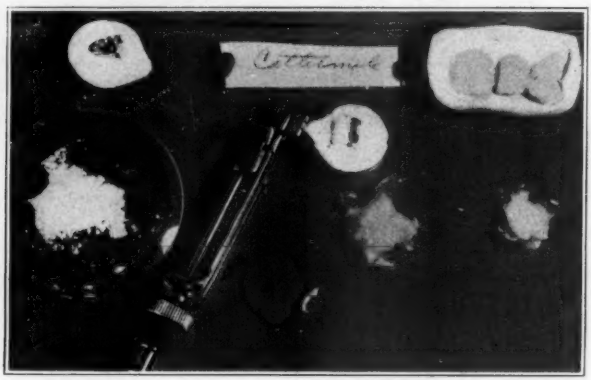

Fig. 7.—Invested model held in matrix holder.

The use of the binocular loupe as an aid to even the keenest eyesight is advised, not only for this stage of the work, but also for final cavity preparation and matrix fitting. Our eyes are entitled to every aid that we can give them.

The baking completed, the platinum removed, the cavity side of the inlay etched with hydrofluoric acid and the investment, clinging where the base of the matrix was split, ground off, the inlay

is ready to be set, unless it is a cervical or Class 3 cavity, which should be grooved with a small knife-edge stone to form a cement lock, with similar grooves cut with a wheel bur in the side walls of the cavity. This undercutting of the cavity may well be done after the impression has been made or the matrix fitted and while the cavity preparation anesthesia is still in effect.

For esthetic reasons, porcelain inlays are best set with a fine grained silicate cement, care being observed in the shade selection. The silicates also serve a useful purpose as temporary fillings between sittings, in place of the unsightly gutta-percha. These can be readily removed if a layer of temporary stopping is placed in the deeper portion of the cavity.

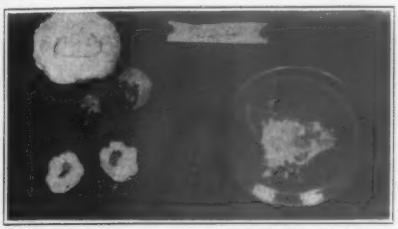

Fig. 8.—Case record; plaster model showing space to be restored by inlays; copper deposit models; invested matrices; porcelain body covered with watch crystal.

Fig. 10.—Prepared cavities in left central and lateral incisors.

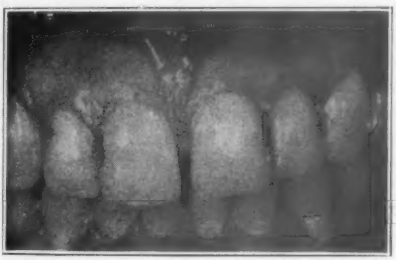

Fig. 9.—Defective and discolored silicate fillings in left central and lateral incisors.

Fig. 11.—Porcelain inlays set in left central and lateral incisors.

A well-fitted porcelain inlay set with silicate cement shows no unsightly cement line and makes at once an esthetic and an enduring restoration. (Figs. 9-11.)

1206 Republic Building.

LABORATORY FACILITIES FOR DENTAL RESEARCH IN BASIC SCIENCES AT THE UNIVERSITY OF MINNESOTA

By Peter J. Brekhus, B.A., D.D.S., Minneapolis, Minn.

An accusation frequently made against dentistry, especially during recent years, is that its technical improvement has far outstripped its scientific progress. That the application of basic scientific discipline to dentistry is urgently needed is evident from the paucity of our knowledge concerning many serious dental problems, notably that of caries. A few dental schools affiliated with large universities or closely connected with medical institutions are beginning to meet this situation by establishing departments or divisions of dental research. Among these is the Graduate School of Dental Research of the University of Minnesota.

In the January 1939 *Northwest Dentistry,* we presented the first report on graduate dental research at the university. The present article will endeavor to bring up to date the reader's knowledge of what has been done during the past year and what is now being done in this respect. Surveying briefly the history of the graduate dental research division, we may say that sporadic projects had been carried out for many years, but in 1931 the work really got under way. W. D. Armstrong was given charge of biologic research in dentistry and proceeded to carry on a number of basic scientific studies, which have been published from time to time. C. E. Rudolph has meanwhile directed research in orthodontia, and Charlotte Fisk has been studying the relations between general and oral health. Funds for carrying on the work have been provided mainly by the graduate school, the dental research program having enjoyed the cordial support of Mr. Guy Stanton Ford, as dean of the graduate school and, later, as president of the university.

Excellent facilities for the biochemical investigation of fundamental dental problems are provided in the laboratory that has been set up in the school of dentistry at the university, and a wide range of clinical material is available through the dental infirmary and the various departments of the university hospital, particularly that of pediatrics. The small permanent staff of the graduate research division is augmented by the presence of workers who receive fellowship grants from the Carnegie Corporation and other graduate students in dentistry who are seeking the degree of master of science. Since the securing of this degree depends in part on completion of a piece of original research, many projects have been undertaken or are now under way that may have an important bearing on the unsolved problems of modern dentistry.

The chief objective of the dental research laboratory at the university, however, is not the immediate application of scientific discoveries to well-known dental problems. Its main concern is with those fundamentals that, until recently, have been almost entirely outside the scope of dental work—partly because no funds have been available for pure research in dentistry and partly because the interests of the profession have been concentrated much more on technical restorative work. Since it is new, the work that Dr. Armstrong has been and is doing merits a brief survey.

One of the first contributions described a method for the separation of enamel and dentin, providing the essential groundwork for microbiologic study of the constituents present in only minute quantities in the teeth. In 1937, Dr. Armstrong showed the importance of one of these constituents, fluorine, as possibly influencing the susceptibility of individual teeth to caries. He has found that the amount of fluorine is nearly always significantly greater in sound teeth than in carious teeth, the average fluorine content of sound and carious teeth being 0.0111 and 0.0069 per cent, respectively. "The results of fifty consecutive analyses show that generally a low fluorine content is characteristic of carious teeth."

Fig. 1.—Carnegie fellows using photoelectric colorimeter.

Teeth moderately affected by the fluorine mottling due to the presence of this element in the drinking water in some localities seem to be more resistant to caries than normal teeth, but "teeth with severe degrees of mottled enamel and containing an increased amount of fluorine may become carious." Work carried on subsequently in laboratories elsewhere has tended to support Dr. Armstrong's findings.

During 1938 and 1939, Dr. Armstrong spent several months in dental research in the Scandinavian countries and England, on a grant from the Commonwealth Fund. In Copenhagen, he worked with Professors A. Krogh and G. Von Hevesy, using radioactive isotopes to study the transfer of phosphorus between enamel and dentin on the one hand and blood on the other. At the Lister Institute in London, he worked with Robert Robison on the calcification of bones outside the body, and also visited various other centers of medical and dental research.

At present, Dr. Armstrong is directing further biochemical investigation of fluorine in the calcified dental tissues. Another project under way is his study

Fig. 2.—Incubator used in *in vitro* calcification studies.

of the effects of a severely deficient diet on the fully formed teeth of laboratory animals. The American Medical Association has expressed its confidence in Dr. Armstrong's work through the gift of a sum of money to finance further studies using the Robison technic.

It is to be hoped that such studies as those now under way at the University of Minnesota are only the beginning of a long-delayed application of fundamental scientific disciplines to dental problems.

Opportunities are increasing year by year for gifted young scientists to pursue this type of work. Graduate study in dentistry can now be carried on at the University of Minnesota in oral pathology, orthodontia, oral surgery or restorative dentistry. In the field of oral pathology, the graduate student must devote approximately one-third of his time to basic science courses. From such a program, we may hope for advances in this field comparable to those that have been recorded from similar studies of other diseases. By getting down to fundamentals, examining minutely and accurately the structure and composition of human and animal teeth, sound and carious, we may well unearth some of those secrets of dental and oral pathology that have long eluded us. Work like that now being carried on through the Graduate Dental Research Laboratory at the University of Minnesota is at least a promising step in the right direction.

Fig. 3.—NYA worker cleaning apparatus.

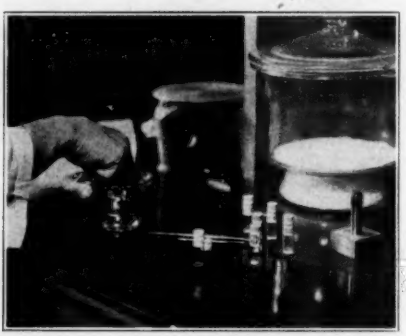

Fig. 4.—Pulverizing teeth for separation of enamel and dentin.

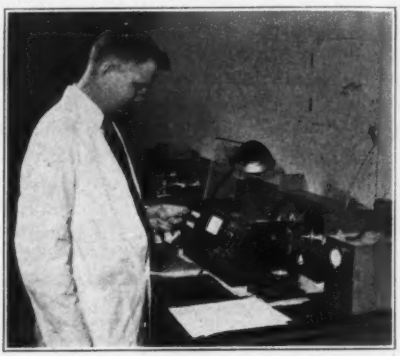

Fig. 5.—Determination of radioactive isotopes.

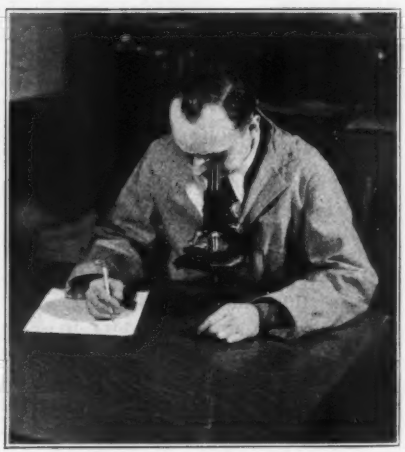

Fig. 6.—Microscopic examination of salivary organisms.

University of Minnesota.

"ABSCESSES"; TEN-FIFTEEN YEAR "CURES"

By CHARLES W. RIGGALL, JR., D.D.S., Philadelphia, Pa.

THE mission of dentistry is to save teeth, to restore defective teeth to health and usefulness.

The extraction of a tooth, like the amputation of a leg or an arm, or the surgical removal of any organ, should be the last resort, the end-solution of the problem presented. Organs have their natural duties to perform and substitutes always have some defects or are associated with certain inconveniences. Therefore, the problem of root-canal treatment or sterilization deserves any conceivable thought which might aid in restoring a tooth to health and usefulness.

To judge from a review of the literature and proceedings of meetings in the 1920's, a vast majority of dentists and physicians of that decade had accepted the idea that it is hopeless and dangerous to attempt, under any circumstances, the elimination of infection from the root canal of a tooth. It was demanded that "all dead teeth be extracted."

In the mind of the profession, however, there has since arisen some question and considerable discussion as to what constitutes a dead tooth.[1] Also, a number of investigators, some in private practice, some in institutional work, have continued, with possibly an increased intensity, their observations and various treatments of infected teeth.

With exacting technics and careful operating, there has been a good average of success, but the good results have possibly not received the attention and publicity they warrant, owing to the comparatively small number of men who do the work successfully, and the very large proportion who attempt rapid and unmethodical treatment, with indifferent success.

Numerous operators have exhibited cases of pulpless teeth treated successfully by sterilization. A careful and thorough technic, which is always necessary, is effective in many cases. Johnson, Rickert, Crane and others have had excellent results, proving that effective work can be done, and teeth and patients have remained normal for many years.

Some teeth are more virulently infected and certain patients have higher opsonic indexes (resistance to infection).

Some infections are of longer standing than others, and certain teeth present mechanical disadvantages; that is, the root canals are inaccessible, because of curved roots. Also, the tooth itself may be so far back in the mouth as to be out of range of the required instruments.

Teeth that are inaccessible for any reason should not be subjected to treatment of any type. Also, we see teeth that, under favorable mechanical conditions, present very serious infections, and so should not be treated.

The application of powerful antiseptics, including phenol, sulfuric acid, creosote, formalin, silver nitrate and formocresol, and ionization sterilizes the root canal and accessory openings in the tooth. But, in certain teeth, discharge of pus through the root canal or a gum fistula, or both, continues. Something more is required than sterilization of the root canal in such areas of infection. Cauterizing the fistula sometimes is sufficient, but frequently is not.

About 1914, root amputation, the removal of the diseased apex of the tooth, was introduced. This was successful under certain conditions, but many of its enthusiasts have given up the practice. Amputation frequently resulted in chronic infection, attended, in a com-

paratively short period, by fistula. It therefore was obvious that more than the sterilization of the root canal, or the removal of the apex, with its attendant surgical complications, was necessary to restore infected teeth to a healthy condition.

When a root canal has become infected, after a certain period the infection spreads, logically following the lymph and blood vessels as in other parts of the body.

The painful, swollen, acute abscess perfectly illustrates this fact. Under such conditions, opening the root canal through the tooth, or puncturing the gum over the area relieves the swelling and pain, and much of the infection is eliminated by drainage, but not all.

The resistance of the patient overcomes the infection in the area outside the tooth. Blood of high opsonic index does wonders. Therefore, the artificial sterilization of the root by germicides, with the help of the patient's resistance, frequently restores the area, including tooth, alveolus and soft tissue, to health. However, this is not enough with long standing infections. Nature requires more assistance, and now we can control the conditions in the tissue beyond the root by the application of antiseptics, or, we may say, we can locally raise the opsonic index.

These are the most important accomplishments of modern root-canal therapeutics. Lack of both interest and information have been great drawbacks.

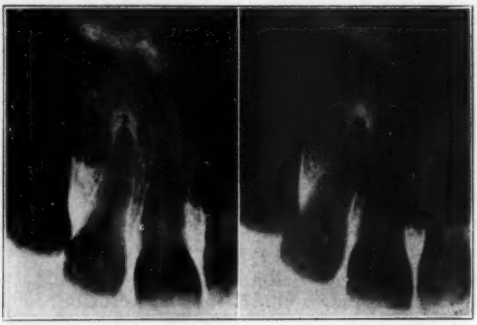

Fig. 1 (Case 3).—Upper incisor from which pulp had been partially removed; showing acute abscess.

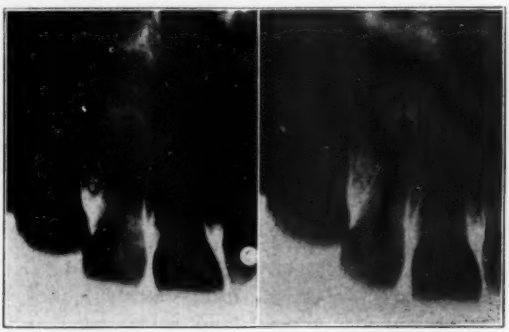

Fig. 2 (Case 3).—Case fifteen years after treatment; showing progress of regeneration with eventual complete absorption of excess root filling.

The exactness demanded by the technic, the time involved in the procedure and the patient's unwillingness to give the necessary time and to pay a reasonable fee for the operation have all been sources of discouragement in the work.

It is the periapical area with which we are really concerned for the well-being of the patient. The tooth is only of treatment, with the hope that the natural resistance of the patient will be sufficient to overcome periapical inflammation and infection.

Many times, this is sufficient, as the work of careful operators in this field has frequently shown. We see many such teeth, in good practices, treated by unusually good operators. However, teeth

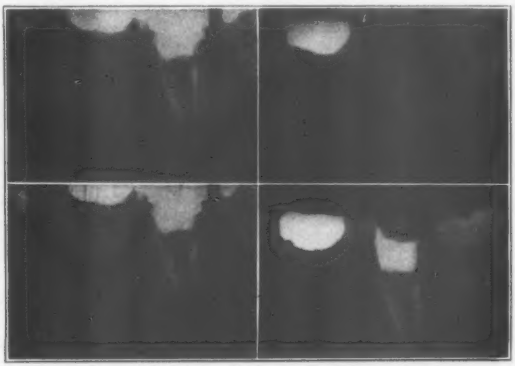

Fig. 3 (Case 4).—Lower second molar with large cavity and putrescent material in pulp chamber and canals.

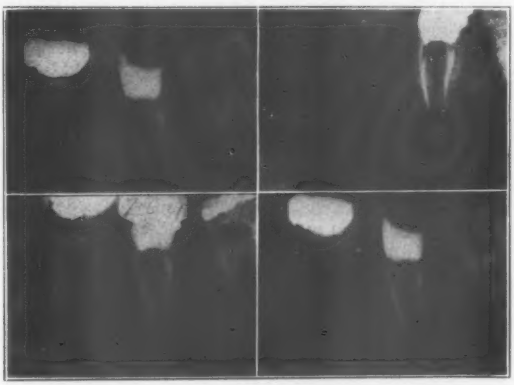

Fig. 4 (Case 4).—Film taken seven years after treatment; showing regeneration.

an indirect means of restoring, as well as preserving, the health of the tissues. This, it seems to me, is the crux of the root-canal situation. Most of the work is centered on the tooth itself, usually ignoring the periapical area.[2] Sterilization of the tooth is considered the limit

treated successfully by this method probably never had severely infected periapical areas, but may have had considerable infection in the canals.

In a great number of cases of infected root canals, the loss of periapical tissue has resulted from invasion of the tissues

beyond the canal by the infective organisms. In many cases, the mere sterilization of the root canal is not sufficient; for the natural resistance of the patient does not suffice to overcome the infection present in the periapical tissues. Sometimes, in an upper tooth, if the root is straight and easily accessible, the infective area will be drained by gravity, and sterilization thereafter of the root canal will result in sterility of the periapical area.

Usually, the infective area requires direct attack with a powerful antiseptic. This was for many years an insurmount-

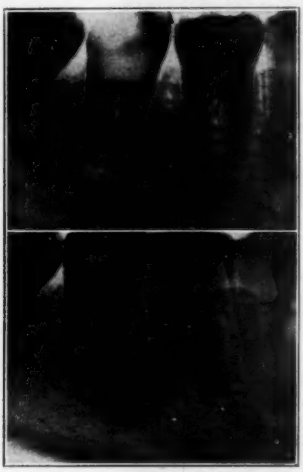

Fig. 5 (Case 4).—Above: Lower second molar before treatment. Below: Condition seven years after treatment.

able obstacle, as the commonly used strong antiseptics are also very caustic. If they enter the periapical tissue, chemical necrosis is the result, necessitating extraction of the tooth.[2] Dichloramine T[3] is a powerful, non-irritating antiseptic, if the technic is not faulty.

Records should be kept, including roentgenograms, of course, of cases in private practice with patients of average social position, normal standards of living and in normal health.

Many surveys have been made of clinical records wherein conditions of living affecting diet, etc., might be factors in the general resistance (opsonic index, etc.), but these are not really typical[4] of cases seen in the average private dental office.

Many references are made to the possibility of "preventing a tooth from which the pulp has been removed, from being a menace, or serious threat to the future health of the patient." This is the objective of root-canal work. Some men have taken the position that such a tooth is sure to be a menace, and have sought to support their theory by various means of culturing[5] and examining extracted roots; also, by showing the physical difficulties of artificially filling the area from which pulp tissue has been removed, the inference being that all areas occupied by the pulp tissue must be artificially and hermetically sealed permanently. Some operators have considered a devitalized tooth, one from which the pulp is removed, a foreign body and a form of irritant. Recent emphasis on peridental membrane physiology has dissipated this thought in the minds of informed workers in this field.[1]

The following cases are presented with a view to adding to the data on infected teeth that have been treated. The roentgenograms extend over a period of from ten to fifteen years, in some cases exceeding this period. In all cases, the teeth had badly infected root canals and large apical areas of alveolar destruction, which, as shown in the roentgenograms, extended, in some cases, along the mesial and distal sides of the root well past the apex. The period of time elapsing from the beginning of treatment of the infected areas was usually about one week.

The antiseptics used were dichloramine T, with Prinz's[2] technic, and Howe's[5] ammoniacal silver nitrate, formalin technic. In some cases, a combination of the treatments, with slight modification, was used.

Many histologic theories have been

developed to disprove the possibility of successful root-canal treatment. These, however, must accept the results of successful treatment, as all laboratory data must be submissive to clinical experience.[7]

REPORT OF CASES

CASE 1.—A lower molar showed an acute abscess, with mesial canals partly inaccessible.

Treatment.—3-2-23: The canal was opened and pus was revealed in the canals, with the pulp chamber overflowing.

3-5: Silver nitrate and formalin treatment was administered.

3-8: The treatment was repeated.

3-15: The treatment was repeated, with dichloramine T added.

3-17 and 19: Results were negative.

3-21: Silver nitrate, eugenol and eucapercha were inserted.

History.—When first seen, the case had a very unfavorable prognosis. The mesial roots were partly inaccessible. There was considerable pain, but no swelling, with an overflow of pus through the top of the pulp chamber. The patient was unable to keep regular appointments, so that the treatments were off schedule. Nevertheless, the infection was eliminated. The roentgenograms represent a fifteen-year interval.

Comment.—The condition of the treated tooth and the adjacent area is of more than usual interest. The apical tissues are in normal condition, the lamina dura is intact and the alveolar structure is perfect, but the marginal alveolar area has undergone extensive resorption. There is no evidence of unusual surface infection or of pus.

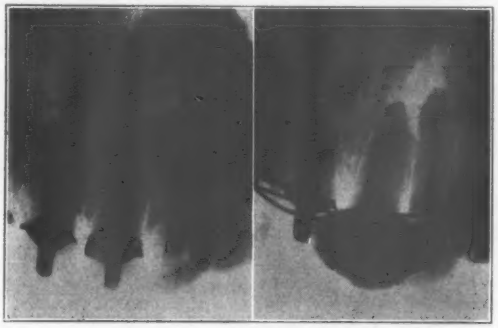

Fig. 6 (Case 2).—Left: Treated lateral and central incisors. Right: Condition nine years after treatment. The perforations are sealed with silver nitrate and there is complete regeneration of the alveolar structure.

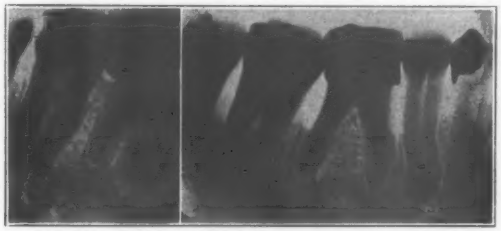

Fig. 7 (Case 1).—Left: Lower molar with acute abscess and partly inaccessible canals. Right: Condition fifteen years after treatment. Silver nitrate fills the apex of the curved root canal. There is marginal absorption of the alveolus, but the periapical tissues maintained their regeneration.

The general concept that pulp removal leaves a vulnerable focus of lessened resistance, regardless of attempts at steri-

lization, seems to have at least some exceptions.

This patient made very irregular dental visits, often several years apart. However, he made good use of the toothbrush.

CASE 2.—*History.*—X-ray examination revealed a large translucent area over the upper lateral and central incisors. The pulps had been removed about six years previously, after injury in a football game. A pivot in the root canal of the central incisor was removed with some difficulty. The lateral canal presented no problem.

The teeth had caused no pain (except once in eating hardtack in the trenches). There was no pain, nor were there external signs of infection. The patient was healthy. Roentgenograms were the only diagnostic aid. After the canals were opened, there was some swelling with pain, which subsided without further incident.

The roentgenograms represent an interval of nine years.

Treatment.—2-22-21: The canal of the lateral incisor was opened.

2-23 to 28: Dichloramine T was employed in treatment.

3-2: The canal was filled with eucapercha.

3-7: The crown and pivot was removed from the central incisor.

3-8: Silver nitrate and dichloramine T were applied. Several old perforations were found.

3-9 and 10: Dichloramine T was employed.

3-11: The canal was filled with eucapercha.

Outcome.—On removal of the pivot, the root structure was found to be a trifle soft. There were several old perforations. Silver was precipitated in these to avoid reinfection. A temporary tooth was wired in place after each treatment. The large area filled in quite rapidly after the treatment, with no further incidents. Periodical x-ray films provided an interesting study of the regeneration.

Comment.—It will be noted that the lamina dura, after apparently being destroyed, regenerated or was replaced. This is in accordance with many of my observations, but has long been considered contrary to histologic principles.

CASE 3.—*History.*—The pulp of an upper incisor had been partially removed approximately eight years previously. Examination revealed an acute abscess, with some swelling, pain and slight extrusion.

Treatment.—1-24-21: The canal was opened.

1-31: Sulfuric acid treatment was employed.

2-1 to 3: Dichloramine T was employed.

2-4: The canal was filled with eucapercha.

Outcome.—Seventeen years after treatment, the tooth crown is exactly the same shade as its neighbor, with no discoloration or shadow. Figure 2 shows the condition fifteen years after treatment. There is complete resorption, by phagocytosis, of the root-canal filling material forced through the apex. The lamina dura is in perfect condition, also the surrounding alveolar structure.

CASE 4.—A lower second molar was treated as follows:

1-6: The canals were cleaned and treated with acid.

1-7, 8, 10, 11, 13, 15: Dichloramine T was employed.

1-17: Acid treatment was given, with dichloramine T.

1-8: Dichloramine T was employed.

1-20: The canals were filled with eucapercha.

The tooth presented a large cavity, with putrescent material in the pulp chamber and canals. There was no swelling and no pain. Some pain developed during treatment, but subsided quickly. The alveolar area regenerated far up the mesial surface of the root. There was a seven-year interval between roentgenograms. The last roentgenogram taken at an off angle showed a curved root canal.

CONCLUSIONS

Many pulpless teeth and periapical areas of infection can be successfully treated. A definite, careful technic is required in properly selected cases.

Roots in which the external surfaces have been partially destroyed by necrotic processes are not to be considered for treatment except under unusual conditions where root amputation might be indicated.

The x-rays are essential in diagnosis and also in deciding the type and extent of

treatment. The clinical symptoms are also important in management of the case.

The cases cited are of the more difficult type from my file of more than 600 cases. If a definite technic can clear up these conditions, it seems reasonable to assume that less advanced cases would quite certainly be successful.

Along with careful technic, it is also essential to use drugs in perfect condition. Drugs undergoing deterioration have no place in root-canal work.

Many cases are more of an economic problem than a bacteriologic puzzle.

Time affords a final critical test of whether a case is cured.

Laboratory experiments and theories must give way to clinical evidence. Proper drugs skilfully used are essential to successful treatment.

"Science relies upon experience rather than authority." (Julian Huxley.)

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EXODONTIA FOR THE GENERAL PRACTITIONER

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As a rule, the public does not consider the removal of a tooth an important operation, owing to the fact that, in most cases, the results are favorable. There is also another reason for this attitude. Down through the years, some members of the profession, with the assistance of many of the medical profession, have educated the layman to this point of view. There are a great number of dentists and physicians who seem to be in the dark regarding some of the serious complications which may be associated with the removal of teeth under certain conditions.

It is the duty of every dentist to impress upon his patients the fact that the operation for the removal of teeth, as well as other operative procedures performed by the dentist, is just as important as many of the operations performed by the family physician or the general surgeon. If patients are made to understand what takes place when a tooth is removed, they will more easily understand why they may need treatment before or after extraction, as the case may be, to relieve discomfort and insure recovery.

In the removal of teeth, there is, in every case, a degree of uncertainty as to the ultimate result. Therefore, every case should be carefully evaluated before operation. There is an Italian proverb that "he who goes slowly goes safely; he who goes safely goes surely." This may well be taken as a guiding text in exodontia. In addition to the surgical operation which is performed in removing teeth, the mental attitude of the patient

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should be kept in mind. The element of fear is a problem which must be faced in exodontia. The apprehensive, unreasonable, neurotic and temperamental types of patients are frequently encountered. We should endeavor to care for the patient in such a way as to avoid as much shock to the nervous system as possible. The technic of the operator may be flawless, but unless psychic trauma is kept to a minimum, the success of the operation, as a whole, will not be regarded too highly by the patient. Gaining the confidence of the patient, and the use of premedication, will do much to improve an unfavorable mental attitude.

Children usually show the results of home training. The child patient, as well as the adult, does not forget an unfortunate experience in the dental office. If possible, the confidence of the child should be won and maintained. Kindness and an endeavor to divert the child's attention from the unpleasant part of the operative procedure will do much to overcome many difficult aspects of the case. If all else fails, the course best suited to all concerned must be followed. Premedication of the nervous, spoiled or unruly child will have results which the application of child psychology will not have.

If the systemic condition contraindicates either local or general anesthesia, it is advisable to consult the family physician. If there is an unfavorable reaction, this consultation will be a protection to the operator as well as an aid in gaining the confidence of the patient. The physical condition may indicate hospitalization. We should not forget that there is a vast difference between the reaction of both the patient and the public if the operation is performed in a hospital rather than in a dental office, in case any serious complications arise.

We should bear in mind, however, that most medical men have had little, if any, training in oral surgery, dental diagnosis and dental roentgenography. Therefore, if we, as dentists, are to be responsible for the outcome of certain operations in the oral cavity, we should have something to say as to how and when the operation should be performed, as far as local conditions are concerned. For several years, dental educators have been teaching the dental student more about medicine than ever before; which is necessary to the present practice of dentistry. There will never be any great degree of understanding and cooperation between the dental and the medical profession until all medical schools teach their students something about dentistry and thus both professions be enabled to render a better health service to the public.

The age, physical condition, complaint and medical and dental history of the patient are important. A careful examination should be made to assure correct diagnosis. The importance of diagnosis must not be underestimated. It may be advisable to build up the resistance of the patient before the operation. The use of dicalcium phosphate with viosterol, or other agents, in addition to nourishing foods, seems to be helpful when postoperative hemorrhage is expected.

The number of teeth to be extracted at one operation varies with the individual case, all factors being taken into consideration. When teeth are impacted, or in an abnormal position, the probable results of the operation, as well as the indications for removal, should be considered. The general practitioner should not attempt certain operations in the oral cavity unless he has had sufficient training and experience to insure a satisfactory result. Thus, much regret will be avoided and he will retain the respect of his patients.

A careful clinical examination of the teeth and the oral cavity should be made before extraction to rule out any local conditions or systemic symptoms which may interfere with a successful outcome. An outstanding example is the inflamed flap of soft tissue, which we so often see

associated with the erupted or unerupted lower third molar. Many of these flaps hide a septic pocket, which is an ideal breeding ground for bacteria common to the oral cavity.

While it is impossible to obtain sterility in the oral cavity, we should cleanse the soft tissues and the teeth before operating. When there are acute infections involving the soft tissues, treatment should be instituted to clear up the acute symptoms, if possible, prior to any operative procedure.

The choice of anesthesia is influenced by several considerations. Most general practitioners use local anesthesia in the majority of their extraction cases. Others may use a genëral anesthetic in some cases. The operator should use the anesthetic which he thinks is best suited to the individual case. The training of the operator, the wishes of the patient, the age and local and systemic conditions must be considered.

Preoperative roentgenograms are a great aid not only in successfully removing teeth, but also in disclosing other conditions which may be present.

Acute infection of the oral cavity always presents a problem. There seems to be a difference of opinion in both the dental and the medical profession as to how these conditions should be treated. On the one hand, we have the conservatives; on the other, the so-called radicals. The treatment of an acute periodontal abscess consists in following out the surgical principles underlying the treatment of any abscess. It is based upon the drainage of the focus with the least possible operative trauma to the surrounding tissues. If localization has not already occurred, treatment to obtain it may have to be applied. The hard and soft tissues of the oral cavity should be treated by the dentist with the respect that the physician shows to other parts of the human body. Treatment of osteomyelitis of the tibia is not based primarily upon amputation of the leg involved.

It is always a risk to extract a tooth which is involved in an acute infection where the surrounding soft tissue and bone will be lacerated and traumatized, and thus new channels be opened for the existing infection to enter and possibly cause a secondary infection, diffuse in character, which, in turn, may prove more serious than the primary infection.

In order to obtain drainage where the infection is confined to the immediate vicinity of the apex or the body of the root which is somewhat loosened and is acting as a plug to prevent drainage, it is sometimes advisable to remove the tooth, preferably under general anesthesia or, in some cases, with the aid of block anesthesia. A preoperative x-ray picture is very helpful in these cases.

Inflamed soft tissue over a partially erupted or an impacted third molar should not be incised unless there is definite fluctuation, which usually indicates localization of the infection. Incision of inflamed soft tissue during the onset of an acute soft tissue infection only tends to spread the primary infection beyond the circumscribed area of inflammation by opening new channels for the causative bacteria to be carried through the protective zone formed by the leukocytes which wall off the initial infection.[1] For the same reason, the unwarranted use of a curet in an acute infection may lead to a serious condition.

The location of the infection has much to do with the outcome, owing to the fact that the bone in the mandible is more condensed and that the blood stream and the lymphatic circulation do not have so good a chance to overcome the primary infection in the mandible as in the maxilla, where the bone is more cancellous and the blood supply and the lymphatic circulation are richer, in addition to the fact that there is a natural drainage due to gravity.

The most severe and frequent infections follow extraction of the lower

molars and bicuspids. This is notably true with lower third molars that are not completely erupted. Next in frequency are infections in the upper molar and bicuspid regions. When an acute pericoronal infection involves a lower third molar, it is best to reduce the acute symptoms before the tooth is removed; otherwise, the soft tissue, which is more abundant at this point, will become invaded by the bacteria, and a severe postoperative condition may result. The frequent occurrence of this condition around erupting upper third molars should be treated in the same manner.

When Vincent's infection is present, it is unwise to operate because of the danger of a mixed infection.

If there are pain and swelling around a carious, pyorrheic or non-vital tooth, there is already, in many cases, a localized osteomyelitis.[2] Therefore, the general rules for treatment of a diffuse osteomyelitis must be kept in mind. Necrosis following extraction was known as long ago as 1710. At that time, Heister warned against the removal of teeth in inflammatory conditions of the jaws.

In an analysis of 234 cases of osteomyelitis of the jaws treated and observed by V. P. Blair, J. Barrett Brown and W. G. Hamm, in the Department of Surgery, Washington University School of Medicine, St. Louis, Mo., from June 1925 to March 1934, 105 cases were associated with the extraction of teeth during the acute stage of infection; seventeen cases were associated with fractures; seventy cases were traced mostly to carious teeth, and, in the remainder, there were various other causes. There were 186 cases of osteomyelitis in the mandible and forty-eight in the maxillae. Thus, the ratio in this series of cases is about four in the mandible to one in the maxillae.[3]

Postoperative complications following the extraction of teeth during the acute stage of a fulminating infection are more apt to result in diffuse infection of the soft parts than extensive necrosis of bone.

Infections of the face, and especially the upper half of the face, and the oral cavity are frequently followed by involvement of the adjacent veins with an extension into the cavernous sinus which surrounds the pituitary body. The facial, the angular and the ophthalmic veins evidently contain no valves. Thus, the blood can flow from the ophthalmic vein into the angular and then into the facial vein. In case this flow is reversed by any obstruction, the blood from the face drains into the cavernous sinus. There is always the possibility that a primary focus in these regions may be responsible for a septic condition of the cavernous sinus.[4] This condition has also been caused by incision for drainage before localization occurs.

The majority of cases of acute periodontal infection are the culmination of an infection that has been present for an indefinite and undetermined period. It is only reasonable to assume that a disturbance of the balance between the resistance of the patient and the virulence of the infection has occurred which permits the previously walled off bacteria to attack the confining barriers. Such a period of lowered resistance may account for the fact that the trauma of an extraction may not be well tolerated at this particular time. After treatment to reduce the acute symptoms has been instituted and the balance between virulence and resistance has been reestablished in the patient's favor, removal of the tooth is indicated.[5] Serious complications following conservative treatment are comparatively rare.

When postoperative conditions are unfavorable, the operation, or method of operation, is often held responsible, although the condition may have been caused primarily by preoperative conditions beyond the control of the operator.

OPERATIVE TECHNIC

The teachings of others, combined with personal experience, usually determine

the technic of the individual operator. The removal of teeth should be accomplished with as little disturbance to the surrounding tissues as possible. The methods advocated for routine extraction are many, just as is the case in more difficult operations, such as impaction and other minor surgical procedures.

The first thing to be considered is the application of a forceps technic that will take into consideration the anatomic structure of the teeth, the alveolar process and the soft tissues involved. The principle of axis traction should always be kept in mind in forceps movements designed to remove the various teeth. Many flap operations would not be necessary if the operator would give more thought and time to forceps technic. The application of the forceps technic described by George B. Winter in his work entitled "Exodontia" will eliminate many cases of fractured roots and other unfavorable conditions.

The rational combination of a forceps and an elevator technic will usually minimize the necessity for flap operations. However, when a flap operation is indicated, we should not hesitate to employ it. Many times, the careful application of a suitable elevator to loosen the tooth or root before the forceps are applied, even if use of forceps is indicated, will enable the operator to avoid many of the pitfalls encountered with the use of forceps alone. When teeth are badly broken down, or there are roots remaining, the operator will have to depend on his own judgment as to what technic is indicated.

We should try to protect the operative field from mouth fluids and thus encourage formation of a blood clot in the socket. After extraction of the tooth, loose particles of process, tooth fragments or other débris should be removed from the socket. Sharp edges of process should be removed and, when indicated, prominent septa should be reduced. The soft tissues should be approximated as nearly as possible and, in some cases, it is advantageous to employ sutures.

POSTOPERATIVE CARE

Immediate postoperative care consists in having the patient bite on sterile cotton or gauze for several minutes to keep the socket free from saliva and aid in the formation of the blood clot. This is especially indicated when lower bicuspids and molars are removed. A healthy blood clot is the best postoperative dressing any tooth socket can have. The patient should not use a mouth wash for several hours and should avoid excessive clearing of the mouth, which creates a suction in the socket and may cause hemorrhage. Hot foods or liquids should not be taken until the next day. Use of sedatives and cold external applications tends to make the patient more comfortable and minimize swelling and bleeding.

The day following the extraction, the careful use of a saline mouthwash is advisable. The patient is not allowed to use effervescent mouthwashes, as they tend to break down the blood clot.

Postoperative x-ray examination is indicated if there is any doubt in the mind of the operator as to the condition of the socket or as to the complete removal of the tooth. The legal advantages of postoperative x-ray examination should always be kept in mind. Sometimes, an x-ray examination of the region made several months after the operation is helpful in checking the healing processes, having, as well, a good psychologic effect upon the patient.

The second day following the extraction, it is advisable to have the patient report for postoperative examination; or the first day, if necessary, to check the condition of the blood clot and for other reasons. Postoperative examination usually is more important when lower molars and bicuspids are removed. Good postoperative care will increase the confidence of the patient in his dentist.

No matter how thoroughly we consider preoperative conditions and carry out

the operative procedures, there are some cases which will need postoperative care and observation. The resistance of the patient, the local condition present before the operation, the method of operation, the mental attitude of the patient and other systemic factors have much to do with the eventual outcome of the case.

J. H. Henahan, in discussing the cause of postoperative pain, in a British dental journal, stated:

> The wound resulting from the extraction of a vital tooth, excluding pyorrhea conditions or pericoronal infections, seldom causes post-operative pain to any great extent because the surrounding tissues are normal. The blood clot fills the socket and remains as a protection to the wound.
>
> Any tooth which has been non-vital for a long time, especially following root-canal therapy, has caused pathological changes in the alveolar bone around it. There will be found an exaggerated deposit of lime salts resulting in condensation of the bone, and a decrease in the normal blood supply. This is the type of case in which we have septic alveolus, which on extraction results many times in an unfavorable post-operative condition. In this condition the bone offers a harbor for bacteria which in turn become more active after extraction, causing a breaking down of the blood clot and an inflammatory condition results.
>
> Not all sockets of non-vital or pyorrhetic teeth need post-operative treatment. Unless indicated it is not advisable to use dressings immediately following extraction.
>
> Many of these sockets become active only after 48 hours. When the patient returns and this condition is found, it must be realized that healing in the wound cannot proceed until the blood stream restores the surrounding bone to normal, or nearly so, by dissolving out the excess of lime salts and dissipation of the bacteria and their toxins.
>
> The treatment should consist of irrigation, gentle removal of necrotic blood clot or other septic particles from the socket, followed by local medication which should be deodorant, antiseptic, non-escharotic, anesthetic, and also stimulate new granulation.
>
> The presence of a chronic low grade infection in the bone adjacent to the open alveolus is frequently the source of bacterial reaction and irritation, which may cause pain. This may be due in part to the entry of oxygen into the wound causing a flare up of the bacteria which have been rather dormant.

Most hemorrhages following extractions can be controlled by local treatment combined with a sedative. Recent research carried out by Tainter[6] and others tends to discourage oral administration of hemostatic agents to shorten coagulation time. However, systemic medication administered by mouth seems to be helpful in many cases. No doubt the element of psychology may play a part in the oral administration of hemostatic drugs. Local application of snake venom (fer-de-lance) is said to be effective in hastening blood coagulation.

We should always remember that the removal of teeth is a surgical operation, and that sound judgment plays an important part in the outcome of any surgical procedure. Therefore, we should be guided in surgery of the oral cavity and its associated structures by opinions of men who have spent years of study, combined with unlimited clinical observation, in the field of oral surgery. I refer to such men as V. P. Blair, George B. Winter and the late Truman W. Brophy.

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HYDROCOLLOIDAL IMPRESSION MATERIALS: PHYSICAL PROPERTIES AND A SPECIFICATION*

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HISTORY

CERTAINLY among the first, if not the first, to use the colloidal carbohydrate material agar-agar in a compound for taking impressions of living tissues was Alphons Poller, a Viennese investigator, who was granted a British patent on this material in 1925.[1] Later, an American patent[2] was allowed him. Dr. Poller called his material "negocoll." He sold the patent rights for its dental use to the De Trey Brothers of Zurich, Switzerland, who manufactured a modification of Poller's material under the trade name "dentocoll." Within the last few years in the United States, there have been developed, for dental use, many materials of a similar nature, in most of which the essential and important ingredient appears to be agar-agar.

MATERIALS INVESTIGATED

In order to make this report comprehensive, nearly every hydrocolloidal impression material that is widely used in the United States was investigated. The brand names of these materials, together with the names of their respective manufacturers are listed in Table I. In addition to the commercial articles there listed is one (Gross' formula) that was prepared in the laboratory from a formula found in the literature.[3]

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LITERATURE

Extensive data have been published on the physical properties of hydrocolloidal gels. In 1921, Sheppard and Sweet[4] found that in gelatin jellies the stress was proportional to the strain almost to the rupture point. Two Japanese investigators[5] determined the hardness, imbibition, liquefying and gel-points and viscosity on 1.5 per cent gels of eight varieties of Japanese agar. It appears from this report, which is printed in Japanese, that the properties of "square" and of "thin" agar, obtained from southern Japan, are such that these kinds of agar would probably be the most suitable for use in dental impression compositions. Busse[6] noted that specimens of certain elastic colloids could be greatly deformed and then recover their original size and shape, on removal of the deforming force. Sometimes, recovery would continue over several days. Kern,[7] and later Skinner and Kern,[8] reported extensive and thorough investigations of hydrocolloidal impression materials. Changes in linear dimension in air maintained at different degrees of humidity and in water, and changes in mechanical properties in compression were reported; all of which is very significant as far as the use of the materials in dentistry is concerned.

COMPOSITION AND FORMULA

Determination of the composition of these materials is difficult because of the organic nature of some of the components; therefore, it was deemed inad-

visable, for the purposes of this report, to devote much time to analysis.

The hydrocolloidal material agar, which is obtained from certain species of seaweed, appears to be the basic constituent. Nearly all of the formulas found in the literature and in patent specifications mention agar.

The hydrocolloidal impression materials have certain physical characteristics that are indispensable. These characteristics are mainly those of agar, which presents a striking illustration of hysteresis. The sol or liquid state is reached only when the impression material is heated nearly to the boiling point of water. However, the sol, when once formed, does not harden to the gel until cooled to temperatures near mouth temperature. Thus, there is a lag of from 60 to 70 degrees C. (108-126 degrees F.) between the liquefying and hardening temperatures; a fact of no mean import in dental impression materials of this type. Also, the unusual elastic behavior of the materials can undoubtedly be attributed to the agar constituent.

Formulas in the Literature.—Poller[1, 2] did not report the formulas that he perfected. However, within the last few years, several have been published. An excellent review of the available formulas, including those of his own devising, are given by Clarke.[9] Most, if not all, of the available formulas are apparently designed for use with a brushing technic and are not suited for intra-oral use because they do not have sufficient body. The clinical tests, reported later in this paper, show that dentists prefer stiff materials and that the less rigid materials are unsuitable for dental use.

Variability of Agar.—Manufacturers report that they find it almost impossible to procure agar which is uniform from batch to batch. Agar from different species of seaweed, from different parts of the world or even different parts of the same country, have been shown[5] to have very different characteristics. Many manufacturers have stated that it is necessary to refine the crude product before it can be used in impression materials. For these reasons, it is recommended that the dentist should not attempt to make his own impression material, particularly if he is interested in uniformity of material and in precision work.

TABLE 1.—MATERIALS INVESTIGATED

Trade Brand	Manufacturer	Address
Deelastic	Thomas J. Dee & Co.	Chicago, Ill.
Dentocoll	The L. D. Caulk Co.	Milford, Del.
Elasticol-green	Goldsmith Bros. S & R Co.	Chicago, Ill.
Elasticol-yellow	Goldsmith Bros. S & R Co.	Chicago, Ill.
Gross' formula		
Kerr hydrocolloid	Detroit Dental Mfg. Co.	Detroit, Mich.
Plasticoll	Lee S. Smith & Son Mfg. Co.	Pittsburgh, Pa.
Surgident	Surgident, Ltd.	West Los Angeles, Calif.
S. S. White elastic compound	The S. S. White Dental Mfg. Co.	Philadelphia, Pa.

PROPERTIES IN COMPRESSION

The correlation of the data obtained from laboratory and clinical sources amply proves that compressive strength and deformation are reliable indicators of the value of the materials as far as dental use is concerned. Hence, determination of the properties in compression assumed first importance in the investigation.

Prediction of the behavior of the hydrocolloidal impression materials under stress on the basis of the performance of

structural materials is largely conjecture. When one inspects a test cylinder of these jelly-like materials, one can hardly conceive that stresses up to 3,800 g./cm.^{2} (54 lb./in.^{2}) are required to fracture it or that concordant stress-strain data can be obtained on it. These materials will also show an apparent "cold work" effect when stresses less than those necessary to produce rupture are applied and removed. These and other points will be demonstrated subsequently.

Preparation of Specimens.—Large cylinders, 4 cm. (1.6 inches) in diameter and 7 cm. (2.8 inches) long, were used

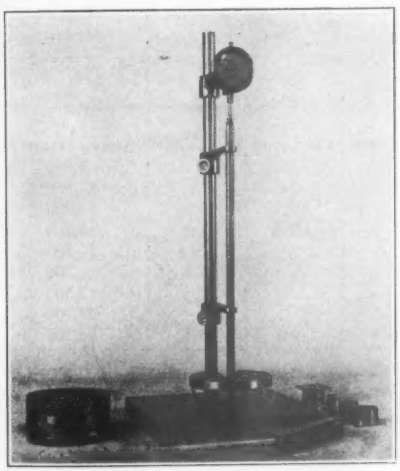

Fig. 1.—Apparatus for determining properties of hydrocolloidal impression materials in compression. (Modification of apparatus used by S. S. White Dental Manufacturing Co.)

at first. These were made by filling a brass mold from the bottom to the top by forcing the heated plastic material from a large mixing syringe into the mold. Later, much smaller specimens, cylinders 1.27 cm. (0.5 inch) in diameter and 1.91 cm. (0.75 inch) long, which were suggested by Crowell,[10] were used. These were formed by pressing brass forms (Fig. 1) into rings that had previously been half-filled with the heated plastic material. Flat metal plates were used on the top and bottom of each mold to form flat and parallel ends on the cylinders.

In the case of the larger specimens, it was necessary to surface the ends by drawing the mold containing the specimen across various grades of abrasive cloth. This procedure was not required when the small specimens were used.

Treatment of Specimens.—After removal from the molds, the specimens were stored in air at 100 per cent relative humidity, at 20-25° C. (68-77° F.) until they were placed in the instrument for testing. During testing, the specimen, protected by a moistened piece of cloth gauze, which was loosely draped about it to prevent severe loss of moisture, was maintained at 20-25° C.

The rate of loading of both the large and the small specimens was approximately 200 g./cm.^{2} (2.84 lb./in.^{2}) each minute on the minute. Observations were taken each minute on the one-half minute. The load increment was gradually placed on the specimen during a ten-second interval. The large specimens were tested in an instrument[11] originally designed to determine the pressing characteristics of denture base resins. The small specimens were tested in the apparatus shown in Figure 1. This is a modification of the instrument used by Crowell.[10] Working drawings of the instrument can be obtained from the National Bureau of Standards by those wishing to construct this type of testing instrument.

Discussion of Data.—A comparison of the data on compressive properties (Table 2) shows great differences among the materials with respect to strength, deformation, set and stiffness. This is difficult to reconcile with the idea that all of the materials, except A, are sold for the purpose of taking one-piece impressions of the oral tissues.

Materials of the type of A, B and C, which are weak, have low deformations and are not very stiff. They are decidedly inferior and were definitely so

judged by the cooperating committee. The other materials, from D to I inclusive, have comparatively great strength and a high degree of deformation and are stiff; qualities that the practicing dentist desires. It is believed that use of any of the materials from D to I will assure satisfactory impressions.

The data obtained upon the large and small specimens are not strictly comparable unless the same batch or lot of material is used. When the same lot of material was used, it was found that the compressive strength and deformation at low stresses (50-500 g./cm.²) were strictly comparable between the large and small specimens, but, at a higher stress range (200-2,000 g./cm.²), the deformation of the small specimens was approximately 50 per cent greater than with the large specimens. These variations were given proper consideration in preparing the proposed specification attached to this report.

Data obtained on representive large specimens are shown in the stress-strain diagrams in Figure 2. Similarly shaped curves were obtained with small specimens.

Stiffness.—The relative stiffness of the various materials is indicated by the slope of the curves shown in Figure 2; that is, the steeper the curve, the stiffer the material. Numerical values for stiffness are given in Table 2, column 8. The larger the number in column 8, the stiffer the material. These values for stiffness, which are rounded off to the nearest 100, were obtained by dividing the greatest stress, prior to the rupture of the specimen, by the total percentage deformation at that stress as shown by the

TABLE 2.—COMPRESSIVE PROPERTIES

Material	Strength*		Deformation*			Set	Stiffness
	Large Specimen†	Small Specimen‡	Large Specimen†	Small Specimen‡			Large Specimen†
1	2	3	4	5	6	7	8
Code letter	G./Cm.²	G./Cm.²	Per Cent#	Per Cent¶	Per Cent§	Per Cent**	Stress/Strain††
A‡‡	500	....	9.6	....	....	...	4,600
B	1,300	1,100	8.0	8.7	....	...	13,800
C	1,700	....	8.8	....	....	...	15,700
D	2,300	2,100	18.6	12.9	16.9	2.4	11,700
E	2,700	....	14.4	....	....	...	17,100
F	2,700	2,800	17.0	4.6	5.5	0.6	16,700
G	2,800	....	14.3	....	....	...	17,500
H	3,100	....	11.6	....	....	...	24,700
I	3,800	2,600	13.9	4.4	5.5	0.8	28,100

*The strength and deformation values on the large and small specimens are not strictly comparable because different batches or lots of material were used in making each size.

†Cylinders, 4 cm. (1.57 inches) in diameter and 7 cm. (2.75 inches) long.

‡Cylinders, 1.27 cm. (0.5 inch) in diameter and 1.91 cm. (0.75 inch) long.

#For stresses between 200 g./cm.² (2.84 lb./in.²) and the greatest stress increment prior to rupture.

¶For stresses between 200 g./cm.² (2.84 lb./in.²) and 1,000 g./cm.² (14.22 lb./in.²).

§For stresses between 50 g./cm.² (0.71 lb./in.²) and 1,000 g./cm.² (14.22 lb./in.²).

**Set observed when stresses of 50, 1,000, 0 and 50 g./cm.² were applied for one minute intervals in the foregoing sequence.

††The stress-strain ratio at the greatest stress increment prior to rupture (Fig. 2).

‡‡Gross' formula (Arch. Path., December 1933).

stress-strain curves in Figure 2. Ordinarily, the modulus of elasticity would be given as a measure of the relative stiffness of the material, but, in these cases, this is not feasible because the shape of the curves indicates that there is no definite proportional limit. Material A is an exception. It appears to obey Hooke's law of the proportionality of stress to strain until the specimen is ruptured. Therefore, the proportional limit of material A is near its ultimate compressive strength.

Deformation.—The percentage of deformation or the degree that the test cylinders were compressed at different stresses is shown in Table 2, columns 4 to 6. It will be noted that material D had the highest deformation. In general, the materials having great strength and a high degree of deformation are relatively tough, and, conversely, materials having little strength and a low degree of deformation are comparatively brittle.

Set.—Table 2, column 7 presents data on the set taken by specimens which were first subjected to a low stress of 50 g./cm.^{2} and then to respective stresses of 1,000, 0 and 50 g./cm.^{2} for one-minute intervals. It will be noted that material D acquired three or four times the set of materials I and F, respectively. Theoretically, this means that if material D were severely stressed, as it would be in withdrawing from an extreme undercut, it would not spring back and render a reasonably accurate negative, at least not to the degree that materials F and I would. As is subsequently shown in the section on impression-taking qualities, this could not be confirmed practically.

Apparent "Cold Working."—Small cylindrical specimens (1.27 by 1.91 cm.) of materials F and I, which were subjected to a stress range of from 200 to 2,000 g./cm.^{2} for one minute and then allowed to rest for an hour free from stress, showed, when again stressed, approximately 5 and 7.5 per cent less deformation, respectively, than specimens which had not been previously stressed. This apparent "cold work" effect is rapidly lost with time. For example, a large cylindrical specimen (4 by 7 cm.) of material I when subjected to a range of

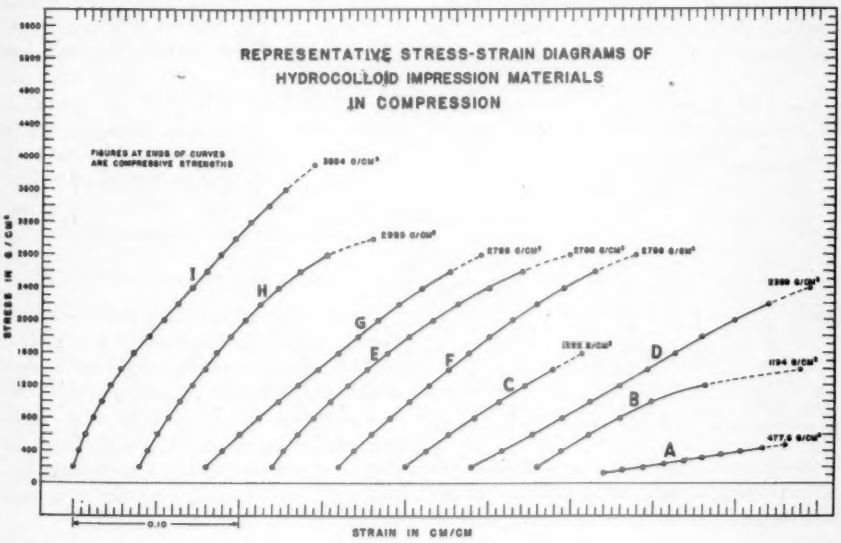

Fig. 2.

stress (200-2,000 g./cm.²) had a deformation of 9.1 per cent. After one minute of application, the stress was removed from the specimen, which was allowed to rest for two hours before the same stress was again applied. The deformation during this stress cycle was only 8.1 per cent, a decrease of 11.1 per cent. When the specimen was 24 hours old and the same stress was again applied, the deformation was 8.8 per cent; which showed a recovery of approximately 70 per cent of the set in twenty-two hours.

The practical significance of these findings is that the repeated stresses that are applied during attempts to remove the impression "cold work" the material and consequently decrease the deformation, thus making it more difficult to withdraw the impression, at the same time increasing the chances of rupture.

TABLE 3.—TEMPERATURE OF GEL FORMATION

Material	Temperature	
Code Letter	°C.	°F.
A	36	96.8
B	36	96.8
C	38	100.4
D	41	105.8
E	41	105.8
F	36	96.8
G	44	111.2
H	40	104.0
I	40	104.0

TEMPERATURE OF GEL FORMATION

Naturally, the temperature at which the material sets to a gel is of great importance from a dental standpoint. If an impression material gels at too high a temperature, its surface tends to set when contact is first made with the tissues. If the material gels at too low a temperature, it is difficult to chill it in the mouth to the temperature necessary for quick and safe removal of the impression.

After experiments with various methods of determining the temperature at which hydrocolloidal materials set to a gel, the following easily conducted test was found to suffice. The apparatus (Fig. 3) employed in the test consists of a metal tube, a trough to contain the material and a thermometer. The metal tube is pressed into and withdrawn from the plastic material in the metal trough at intervals of 0.5° C., until two well-defined concentric circles are produced. The temperature at which this occurs is approximately that at which the impression sets to a firm gel.

Data derived from this test are shown in Table 3. The highest temperature at which any of the materials gelled was 44° C. (111.2° F.). However, material G, which had this high gel point, is easily and satisfactorily manipulated in the mouth. From the data in Table 3, it can be safely assumed that all of the materials tested were satisfactory as far as point of gelation is concerned.

CLINICAL INVESTIGATIONS

It was desired to obtain expert clinical opinion upon the comparative satisfactoriness of the various types of hydrocolloidal impression materials which were in current use. Consequently, P. C. Lowery, chairman of the Research Commission of the American Dental Association, delegated to a special committee investigation of the materials clinically.

Five trade brands of materials: dentocoll, elasticol-yellow, plasticoll, surgident and S. S. White elastic compound, which present different physical characteristics, and one material (Gross' formula[3]) that was made in the laboratory, were sent to the committee for investigation.

These materials, before they were sent to the committee, were (1) removed from their original containers, (2) heated and mixed in a syringe, (3) brought to a uniform color by the addition of a suitable quantity of rouge, (4) flavored with oil of cloves until the original flavor and odor were masked, (5) repackaged in cel-

luloid containers coated with wax paper in much the same manner as "dentocoll" is packaged, (6) designated as materials A, B, C, etc. The identity of each sample was thus obliterated, and when the cooperating dentist received the samples, he was unable to distinguish one trade brand from another on the basis of color, odor or style of packaging. Consequently, personal prejudices or prior opinions could not enter into the cooperators' reports on the merits of the respective materials.

2. Plasticoll 27
3. Surgident 24
4. Dentocoll 19
5. Elasticol 3
6. Gross' formula[8] 0

(In all fairness, it should be here stated that the Gross material was designed to be used in the making of face masks, etc., and not for dental impression work.) From the foregoing tabulation, one can assume that the cooperators regard the first four materials as reasonably satisfactory ones and the last two materials

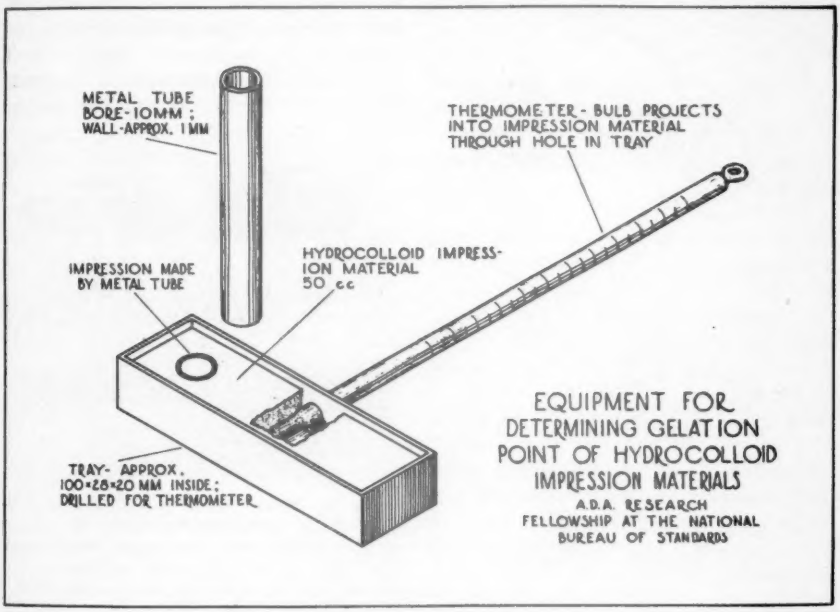

Fig. 3.

Directions for manipulating the materials and a blank form for reporting observations were sent with the samples to each cooperator.

If arbitrary values of 3, 2, 1 and 0 are assigned to the classifications of best, good, fair and unsatisfactory, respectively, the numerical value designated for each material would be as follows:

1. S. S. White elastic impression compound 28

as definitely unsatisfactory. It is a significant fact that the physical properties of the materials also indicate that the first four are the most satisfactory of the six. Thus, the laboratory workers, using physical properties as criteria, selected the same materials as did practicing dentists, who were relying solely on clinical tests, which indicates that the laboratory tests as outlined make a satisfactory basis for the formulation of a speci-

fication or standard for these materials.

IMPRESSION TAKING QUALITIES

One of the chief practical advantages of the hydrocolloidal impression materials is that they can be withdrawn from undercuts. The distortion caused by this withdrawal, even though large, should not be permanent. The accuracy that these materials afford in reproducing irregular and undercut surfaces is an important factor in evaluating them.

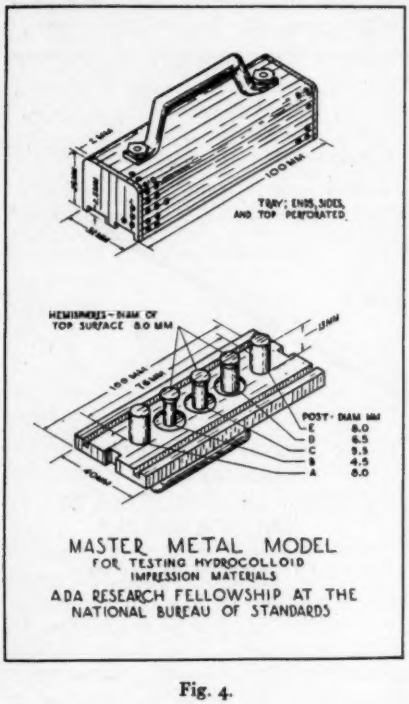
TRAY; ENDS, SIDES, AND TOP PERFORATED
HEMISPHERES - DIAM OF TOP SURFACE 8.0 MM
POST - DIAM MM
E 8.0
D 6.5
C 5.5
B 4.5
A 8.0
MASTER METAL MODEL
FOR TESTING HYDROCOLLOID IMPRESSION MATERIALS
ADA RESEARCH FELLOWSHIP AT THE NATIONAL BUREAU OF STANDARDS

Fig. 4.

Model.—In order to test this quality experimentally, the metal model shown in Figure 4 was used. This model presents five posts mounted on a flat surface. The end posts A and E are cylinders 8 mm. (0.31 inch) in diameter. The posts B, C and D are undercut; that is, the heads of these posts are hemispheres 8 mm. in diameter, while the stem or shaft portions are 4.5, 5.5 and 6.5 mm. (0.18, 0.22 and 0.26 inch) in diameter, respectively. The ratio of the head diameter of posts B, C and D to the stem diameter is approximately 1.78, 1.45 and 1.23, respectively. Thus, the metal model presents a gradation of undercuts that the material under test should accurately register in taking a one-piece impression. It is recognized that the design of this model is indeed arbitrary, but the reduction in diameter and the spacing of the posts and the amount of impression material surrounding the posts are not radically different from conditions often encountered in the mouth. Manifestly, if a material will stretch to such an extent that a body 8 mm. in diameter can be pulled through a canal or tube in the material 4.5 mm. in diameter without rupturing the walls of the tube, it can

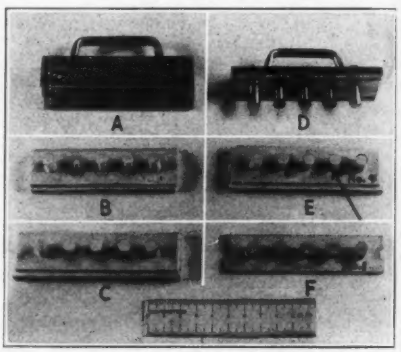

Fig. 5.—Master metal models and gypsum replicas. A, perforated metal tray for carrying impression material to master metal model (D). The etched and rough condition of the surface of B is caused by the reaction of the gypsum to the liquid which exudes from the impression material. If the liquid is removed prior to pouring the gypsum, a smooth surface model (C) will be produced. The rough appearance of the post (arrow) on model E was caused by the tearing of a weak and comparatively inelastic impression material on withdrawal from a severe undercut. F, a model with a base only 3 mm. thick warped (a). The warpage, while significant, was not great enough to show plainly in the photograph.

register almost any undercut found in the oral cavity.

Accuracy of Reproduction of Dimensions.—Taking impressions of the metal model and preparing the gypsum replicas from the impressions was carried out by the following method: 1. The manufacturer's directions, which came with the packages of material, were followed exactly, except that the posts and floor of the metal model were covered with a layer of impression material immediately before the perforated tray filled with the impression material was pressed into place. This coating of material applied with a brush was used to eliminate air traps, which invariably occurred if the coating was not applied. 2. The impression, in place on the model, was chilled with water at 10±3° C. (50±5° F.) for fifteen minutes. 3. The impression was pulled quickly from the model by grasping the handles attached to the tray and model and exerting force in a direction parallel to the long axis of the posts. 4. Immediately after withdrawal of the impression from the metal model, a gypsum model was prepared by gently vibrating the unset gypsum-water mixture into the impression. 5. After the gypsum replica had hardened for one-half hour, the impression material was removed from it.

Measurements were taken on the gypsum model twenty-four hours later. For convenience in description, the foregoing procedure will be hereinafter designated as Technic No. 1. Variations in the technic will be introduced later.

The overall distances between the outside surface of posts A and E (Fig. 4) were measured on both the metal model and the gypsum replica with a micrometer caliper. The difference between these measurements, expressed as the percentage of the corresponding dimension of the master metal model, was corrected for the setting expansion of the gypsum. The resulting value represents the apparent change in dimension of the impression material. The hydrocolloidal impression materials reproduce reasonably accurately those dimensions of a model which do not involve undercut surfaces.

Effect of Technic.—It was desired to determine the precise dimensional change that would be produced when the impression was submitted to a variety of environments such as are encountered in use. In Technic No. 1, the impression was filled with gypsum immediately after it was withdrawn from the metal model. In Technic No. 2, the impression, instead of being immediately filled with gypsum, was stored for twenty-four hours in air at room temperature (20-25° C.) and 100 per cent relative humidity and then the gypsum was poured into it. The data obtained from the measurements clearly indicate that the impressions shrank during storage in air at 100 per cent humidity. These data, therefore, show the same trend as those of Kern and Skinner,[7,8] who reported shrinkage values that were determined directly by means of a micrometer comparator.

Technic No. 1 was again modified. The impression, immediately after removal from the model, was immersed in water at room temperature for twenty-four hours before the gypsum model was made. Expansion occurred, indicating that the material had imbibed water as one would naturally expect a hydrocolloidal material to do.

To detect the effect of leaving an impression overnight before pouring the gypsum model, some impressions were stored for twenty-four hours in air at room temperature and 32 per cent relative humidity. This environment simulated room conditions during the winter months. Under such treatment, of course, the impression material shrank because of loss of water. It may be suggested that, if the impression cannot immediately be poured, it would be best to submerge it in water until the gypsum model can be prepared.

It is clearly realized that the data ob-

tained are relative only. Another design of metal model having different sized posts spaced in another manner would probably change the data, as would many other factors in the design of the metal model and tray.

It is remarkable how small are the differences in the dimensions of the gypsum replicas of the metal model (Fig. 4) even when the impressions in which they were prepared were severely mistreated. The differences are much smaller than those obtained if direct measurements are made on a bar of the impression material that is free to move in all directions. However, when a perforated tray is used to retain the material, and this, of course, is the manner in which the material is actually used in practice, it is plain that the possible movement of the material is much less than in a tray with smooth sides or a sectional tray with movable sections.

Reproduction of Posts with Undercuts.—After the plastic impression material was forced into position on the metal model (Fig. 4) and was chilled in position, it could not be removed without drawing the head sections of posts B, C and D, which are 8 mm. in diameter, through the narrow lumen of the impression material surrounding the stem portions of the posts. In order to effect a successful withdrawal, it was necessary for this portion of the impression to stretch approximately 78 per cent in the case of B (Fig. 4), 45 per cent in post C and 23 per cent in post D. It is difficult to conceive the possibility of such extensive deformation. However, many gypsum models (Fig. 5) that were replicas of the master metal model were made from one-piece hydrocolloidal impressions. It was interesting to note that even though the impression could be withdrawn from the model without rupturing, there was an enlargement of the impression of the stem portions of the posts. The actual enlargements are obtained by calculating the increase in diameter of the stem section of post B of each of the gypsum replicas over that of the metal model and by correcting for the expansion of the gypsum during setting. The stem section of the post is invariably enlarged regardless of the brand of material used. The greatest effect is shown when the gypsum is vibrated into the impression immediately after it is removed from the metal model (Fig. 4).

Leaving the impression overnight in air at 100 per cent relative humidity does not materially change the degree of enlargement. However, if the gypsum model is made in an impression that has been immersed in water for twenty-four hours, the stem portion of post B (Fig. 4) of the gypsum replica is closer to the dimension of post B of the metal model. The hydrocolloidal material swells by imbibing water. If the material can move in any direction, the diameter of the stem portion of post B will be further enlarged. However, the movement of the material is restricted by the perforated metal tray. Consequently, the diameter of the impression of the stem section of post B (Fig. 4) is narrowed (and may be made elliptical if the design of the model and tray is such that the material is free to move a greater distance in one direction than in another) by compressive force exerted by the swelling of the material within the confines of the tray.

If the impression is left overnight in air at 32 per cent relative humidity before the gypsum is placed in it, the stem section of post B on the resulting gypsum replica has a diameter not far removed from that of the same post of the master metal model. In this case, it is the shrinkage of the material in air of low humidity that causes the reduction in the diameter of the stem section of post B.

Thus, shrinkage and enlargement both cause a reduction in the diameter of the impression of the stem because of the design of the tray. In addition, it should

be noted that these hydrocolloidal materials, as was demonstrated in the section on properties in compression, do take a set when severely stressed; also that there is a gradual recovery of this set with time. Thus, an impression which is stored for twenty-four hours before the gypsum model is prepared in it is undoubtedly affected by the retarded elastic recovery of the material.

It is indeed difficult to explain, from the data on deformation in compression (Table 2, column 4) and on elongation in tension, how these hydrocolloidal impression materials can be so drastically deformed without rupturing. The greatest deformation that any of the materials would take in compression without rupturing was about 19 per cent (Table 2, column 4, material D). The elongation in tension of material D was 13 per cent, the highest of all tested. Yet 13 and 19 per cent are far from 78 per cent, the deformation required to permit the drawing of an object 8 mm. in diameter through a tunnel or tube 4.5 mm. in diameter. At first, it was thought that the walls of the impression of the stem section of post B (4.5 mm. in diameter) of the master metal model (Fig. 4) were actually ruptured when the head section of the post (8 mm. in diameter) passed through and that the fine lines of rupture were not detectible because the mass of supporting material forced the ruptured portions back into place. Careful sectioning of the impression showed that this theory was fallacious. Later, it was found that the time factor was extremely important in removing the impression from the model and could be used to explain the behavior of these impression materials.

In actual use, an impression is rapidly withdrawn and the force necessary to dislodge the impression is rapidly applied and released; a procedure which cannot conveniently be duplicated in a laboratory test. The effect of the time factor was demonstrated. Rupture was noted if the impression was slowly removed from the model. The same principle can be easily shown by holding a strip of the material between the thumb and index finger and flipping it up and down rapidly. Even though the strip bends through almost 180 degrees, it is not broken. If the strip is deformed in the same degree and held for a second or two, it will rupture. In other words, the hydrocolloidal impression materials appear to be extremely elastic for large stresses applied and removed very rapidly. The practical point to be gleaned from this experience is that the impression, after being chilled, should be withdrawn from the mouth as fast as is practicable.

PRACTICAL SUGGESTIONS

The hydrocolloidal impression materials are not only used intra-orally but also extensively employed in the technic of preparing duplicate models. In order to make identical, or, rather, nearly identical models, each step in the procedure must be carefully controlled. Not among the least of these steps is the taking of the impression.

Several experiences acquired in the preparation of the large cylindrical specimens used in the compressive strength tests can be directly applied to the technic of duplicating models. For instance, it was noted that the higher the temperature at which the hydrocolloidal material was poured into the brass mold, the greater the shrinkage, as evidenced by the size of the pipe or funnel shaped depression that formed in the top of the cylinder during cooling. The formation of this shrinkage pipe in the top of the cylinder is caused by the initial cooling of the outer shell of material while the internal core remains hot and fluid. Since the top section of the internal core is the last to solidify, the shrinkage becomes concentrated in this section. When the impression material was poured into the mold at the lowest possible temperature, the pipe was small.

This phenomenon is easily explained by the fact that the range of temperature through which the material cooled was much less in one case than in the other and therefore the material shrank less in one case than in the other. Thus, if the mold was filled with the impression material at 75° C. (167° F.) and was then chilled to 25° C. (77° F.), the volumetric shrinkage would amount to approximately 2.2 per cent, if it is assumed that the thermal expansion characteristics of the material are about the same as those of water, which constitutes from 70 to 90 per cent of it. However, if the material was poured at 50° C. (122° F.), the shrinkage would amount to only 0.9 per cent. This does not mean, of course, that the impression will be 2.2 per cent small in one case and 0.9 per cent in the other instance because the shrinkage is largely localized in the shrinkage pipe; which, if properly located, should not seriously affect the size of the impression. However, all things considered, it is better to pour or use the impression material at the lowest temperature at which it is of suitable plasticity.

In making the large specimens for compressive tests, it was noted that the shrinkage pipe could be materially reduced in size or be forced to form outside the mold by placing the mixing syringe containing excess material on top of the mold. This reservoir fed additional material into the mold as shrinkage occurred and was particularly effective if the chilling was progressive from the bottom of the mold to the reservoir. It is noted that some flasks used in the technic of duplicating models have been designed to utilize this principle.

Surface of Models.—In some instances, it was noted that the surface of the gypsum models was smooth and glossy; while, in other instances, the surface looked and felt rough. These models with the rough surface appeared to have been chemically attacked, as in some instances the surface was not only rough, but also soft and had a chalky texture (Fig. 5, B). This type of surface was the result of the reaction of the gypsum to the liquid exuding from an impression that has been severely stressed or allowed to remain in air or water for some time before pouring. If this liquid, which sometimes "bleeds" out of the impression, is absorbed with cotton or blotting paper before the gypsum-water mixture is poured into the impression, the surface of the resulting model is very satisfactory (Fig. 5, C). The exudate has an acid reaction and its presence prevents the proper setting of the gypsum.

If the model is soaked in water and subsequently allowed to dry, the surface will become rough because the water-soluble salts that have been added to the calcined gypsum to control setting expansion, time of setting, etc., come to the surface of the gypsum model and crystallize when the surface water evaporates. In soaking a model before mounting it on an articulator or in a flask, it is suggested that only the base of the model be submerged in water. Besides the roughening of the surface, there is an actual loss of material; that is, the surface is etched to a depth of about 0.05 mm. Such changes in dimension are large enough to merit control, as, in actual practice, the overall dimension between the buccal surfaces of a model of either arch would be shortened by 0.1 mm., or about 0.15 to 0.2 per cent, depending on the width of the dental arch.

Warpage.—Gypsum is relatively a stable material once the dimensional changes caused by the setting are at an end. However, when the base of the gypsum models (Fig. 5, F) was no thicker than 3 mm. (0.12 inch), considerable warpage occurred. This fault was corrected when the base was made 10 mm. (0.39 inch) thick (Fig. 5, C).

SPECIFICATION

The fundamental purpose of the investigation was the formulation of a

specification that would serve as a reliable index of quality for hydrocolloidal impression materials. In order, therefore, to fulfil this purpose, it was necessary to obtain and to correlate clinical opinion and laboratory data, as described in the foregoing sections of the report. With the data previously given as a basis, a proposed specification was drawn and forwarded to dental schools and manufacturers of hydrocolloidal impression materials for criticism. Many of the suggestions received from these groups were incorporated in the following specification.

PROPOSED AMERICAN DENTAL ASSOCIATION SPECIFICATION NO. 11 for HYDROCOLLOIDAL IMPRESSION MATERIAL

A. GENERAL SPECIFICATION.

This specification is for dental impression material the essential ingredient of which is a hydrocolloid such as agar-agar or gelatin, which changes from the gel to the sol on heating and reverses on cooling.

B. TYPES.

Only one type of material is specified.

C. MATERIAL.

C-1. The material shall be uniform and suitable for taking impressions in the oral cavity or for reproducing dental models.

C-2. The material shall not irritate oral tissues and shall have a pleasant odor and flavor.

C-3. The material may or may not contain fibers, as specified by the purchaser.

D. GENERAL REQUIREMENTS.

D-1. The material shall impart a glossy surface to and separate cleanly from the hardened gypsum model.

D-2. The material shall become sufficiently plastic when heated five minutes in a metal mixing syringe in boiling water or ten minutes in the original container to permit removal from the syringe or container and to permit adaptation to the impression tray. After softening and during hardening of the material, the ingredients shall not segregate. The heated material shall be homogeneous, have a smooth surface and be free from lumps or granules.

D-3. At temperatures comfortable to oral tissues (43°-50° C. [109°-122° F.]), the material shall be sufficiently plastic that undercuts and fine anatomic details may be accurately reproduced. However, at these temperatures, the material shall not run out of an inverted perforated metal tray such as is commonly used for hydrocolloidal impression materials.

D-4. Approximately 25 milliliters of the material which has been softened as specified in D-2 shall be placed in a petri dish or similar container and cooled to 20-25° C., (68-77° F.). Mold obtained from stale bread or similar substance shall be used to inoculate the material by making three parallel lines through the material with a needle, which shall have been previously drawn through the bread mold. At the end of one week at 20-25° C., the material shall not show mold growth.

D-5. The names of the preservatives and their respective amounts in percentages by weight shall be furnished to the Research Commission of the American Dental Association as a part of the data accompanying the certification of compliance of the material with this specification. As an alternative to this requirement, the manufacturer shall supply a satisfactory statement, signed by a responsible official of the firm, to the effect that the material does not contain poisonous ingredients in sufficient concentration to cause bodily injury by the ingestion of 30 milliliters of the packaged material.

D-6. The printed directions that accompany the package shall be followed in taking impressions of the metal model (Fig. 4), except that the pins and floor of the metal model may be covered with a layer of impression material immediately before the tray, filled with the impression material, is pressed into place over the posts of the metal mold. The impression shall be chilled in water at 10±3° C. (50±5° F.) for fifteen minutes, after which the impression and model shall be withdrawn from the water and the impression pulled from the metal model. The impression shall not rupture during withdrawal from the model. A gypsum model shall immediately be prepared in the impression by gentle vibra-

tion of the unset gypsum mixture into it. After the gypsum has hardened for thirty minutes, the impression material shall be removed. The surface of the gypsum model shall be smooth.

E. DETAIL REQUIREMENTS.

E-1. *Temperature of gel formation.* The temperature at which the plastic mass sets to a gel shall not be less than 35° C. (95° F.) or more than 45° C. (113° F.).

E-2. *Strain in compression.* a. The strain shall not be less than 4.0 or more than 20.0 per cent between a stress of 100 g./cm.^{2} (1.42 lb./in.^{2}) and a stress of 1,000 g./cm.^{2} (14.2 lb./in.^{2}).

b. The set shall not exceed 3.0 per cent when stresses of 100, 1,000, 0 and 100 g./cm.^{2} are applied for one-minute intervals in the foregoing sequence.

E-3. *Compressive strength.* The compressive strength shall not be less than 2,000 g./cm.^{2} (28.45 lb./in.^{2}).

F. METHODS OF INSPECTION AND TEST.

F-1. *Preparation of test specimens.* The specimens shall be prepared in accordance with the mixing directions that accompany the package.

F-2. *Temperature of gel formation.* Approximately 50 milliliters of the material that has been softened according to the mixing directions shall be ejected into a small metal tray (Fig. 3). As the material cools, a metal tube (Fig. 3) shall be inserted vertically into it, touching the floor of the metal tray. The tube shall be immediately withdrawn. Near the critical point, trials shall be made every 0.5 degrees C. The final trials shall be made in that portion of the material lying near the thermometer bulb. The temperature of gel formation shall be the highest temperature at which the two concentric circles caused by the inside and outside surfaces of the indenting tube are clearly and sharply outlined and the material does not cling to the polished surfaces of the tube. The rate of cooling of the specimen from 50° C. (122° F.) to the temperature of gel formation shall be 1.5±0.5° C. per minute. An average of three tests on the temperature of gel formation shall be reported to the nearest degree centigrade. When this average value falls midway between two numbers, the even number shall be recorded.

F-3. *Strain in compression.* Molds used for forming and apparatus used for testing specimens in compression are shown in Figure 1.

A ring (Fig. 1) shall be placed on a flat glass plate and shall be slightly more than one-half filled with the heated plastic material. A mold (Fig. 1) shall immediately be placed inside the ring and shall be forced into the material until the mold touches the glass plate and the material has exuded on top of the mold. A flat metal plate shall be pressed on top of the mold to remove excess material. One-half hour later, the ends of the specimen shall be made flat and parallel, if necessary, by drawing the mold containing the specimen across No. 00 abrasive paper. The specimen shall then be removed from the mold and placed in an atmosphere of 100 per cent relative humidity at 20-25° C. (68-77° F.) for approximately one-half hour.

The specimen shall then be transferred to an appropriate instrument similar to that shown in Figure 1 and shall be subjected to a load calculated to produce a stress of 100 g./cm.^{2} (1.42 lb./in.^{2}). Thirty seconds later, the dial indicator shall be read. This value shall be designated as reading A. Sixty seconds after application of a stress of 100 g./cm.^{2} (1.42 lb./in.^{2}), an additional load calculated to produce a total stress on the specimen of 1,000 g./cm.^{2} (14.2 lb./in.^{2}) shall be gradually applied during an interval of ten seconds. Thirty seconds after initiation of the stress of 1,000 g./cm.^{2}, a reading of the dial indicator shall be taken. This reading shall be designated as reading B. The difference between readings A and B divided by the original length of the specimen (the original length of the specimen shall be considered as the height of the mold used in forming it [Fig. 1]) times 100 shall be considered as the percentage of strain between the stresses of 100 and 1,000 g./cm.^{2} (E-2a.)

Sixty seconds after initiation of the stress of 1,000 g./cm.^{2}, the specimen shall be released from all stress for a period of sixty seconds. Then a load calculated to produce a stress of 100 g./cm.^{2} shall be applied on the specimen for thirty seconds, when a reading of the dial indicator shall be taken. This reading shall be designated as reading C. The difference between readings A and

C divided by the original length of the specimen times 100 shall be considered as the set in percentage (E-2b).

The specimen shall be tested at 20-25° C. During the test, the specimen shall be protected by moistened cloth gauze to prevent excessive moisture losses. The gauze shall be wrapped loosely about the specimen so as not to support it. After the test, the specimen shall be returned to an atmosphere of 100 per cent relative humidity and stored there until the test of compressive strength is started.

The values for strain (E-2a) and for set (E-2b) shall be reported as the averages of tests on three specimens and shall be recorded to the nearest 0.1 per cent.

F-4. *Compressive strength.* When the specimens that were used in the tests for strain and set (F-3) are 2 hours old, they shall be subjected to the test for compressive strength. Successive loads calculated to produce a stress of 400 g./cm.^{2} (5.68 lb./in.^{2}) shall be applied at sixty second intervals until rupture occurs. Each stress increment shall be gradually applied during a ten-second interval.

The environment of the specimen during the test shall be the same as that specified in F-3.

At least two of the three specimens shall support a stress of 2,000 g./cm.^{2} (28.4 lb./in.^{2}) without rupturing.

G. PACKAGING.

G-1. The material shall be supplied in sealed airtight collapsible tubes, which shall be made of substances that do not have a chemical affinity for or contaminate the impression material and which are sufficiently flexible to permit extrusion of the heated material.

G-2. The net volume or weight shall be indicated on the individual package or on the container.

G-3. Adequate and accurate instructions for manipulation shall accompany each package. These instructions shall include (1) time and temperature requirements for softening the material in the original container and in a mixing syringe, (2) the temperature of the material when inserted in the mouth, (3) the technic for chilling the impression in the mouth and (4) the treatment of the impression between the interval of withdrawal from the mouth and preparation of the gypsum model.

G-4. Each package shall be marked with a serial number or a combination of letters and numbers, which shall refer to the manufacturer's records for the particular lot or batch of material.

G-5. The date of manufacture (year and month) shall be indicated on the package as a separate item or as part of the serial number.

SUMMARY

Some mechanical properties in compression and in tension that have a dental significance were determined on a series of hydrocolloidal materials currently used for taking dental impressions. In addition, properties were determined on a material prepared in the laboratory from a formula found in the literature. The strength and elastic properties of several of the materials were of a comparatively high order. The materials of low compressive strength were decidedly inferior for making dental impressions.

A method was devised whereby the temperature of gelation could be determined. The lowest and highest temperatures of gel formation were 36° C. (96.8° F.) and 44° C. (111.2° F.), respectively.

The accuracy with which the materials would reproduce a complicated model with and without undercut surfaces was determined. Materials that were weak would often tear when the impressions were withdrawn. When no undercuts were involved, the materials reproduced the dimensions usually to within -0.10 ± 0.05 per cent. In the case of undercuts, the error was, of course, directly related to the ratio of the major and minor diameters of the object of which the impression was being taken. When this ratio was approximately 1.78, the error was about $+2.5 \pm 0.5$ per cent.

The impressions were subjected to different environments before the gypsum-water mixture was poured into them. The dimensions of the models prepared

in these impressions indicated the effect of the environment. It was found that it was the best procedure to prepare the gypsum model immediately after withdrawal of the impression. If this procedure was not feasible, the impression should be immersed in water (to prevent loss of water, which causes the impression to shrink) until the gypsum model could be prepared. The impression material should be poured or used at the lowest temperature at which it is of suitable plasticity.

Some of the materials would support mold growth after they were removed from the original containers and were inoculated with mold obtained from stale bread. Other materials would not grow mold when so treated.

The surface of the gypsum model was found to be hard and glossy if (1) the liquid that accumulates on the surface of the impression is removed before the gypsum is poured and (2) the impression material is removed soon after the gypsum hardens. The surface of the model is often very soft and of a chalky texture when the liquid coming from the impression is allowed to contaminate the gypsum-water mixture that is poured into the impression. If the gypsum model is soaked in water for long periods before it is mounted or flasked, a rough and etched surface will be the result. The base of the gypsum model should be at least 10 mm. thick; otherwise, the model may warp.

Expert clinical opinions of the materials were obtained from a committee of practicing dentists who tested and rated commercial products the identity of which was unknown to them. The clinicians rated the materials in approximately the same order as did the laboratory workers.

A specification for hydrocolloidal impression materials based upon information contained in this report and suggestions obtained from a cooperating committee of dentists, dental schools and dental manufacturers, was formulated

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FRACTURES OF THE MAXILLAE AND MANDIBLE*

By C. M. Logsdon, D.D.S., Hines, Ill.

DURING the past seven and one-half years, nearly 200 admissions to the U. S. Veterans Hospital, Hines, Ill., for fracture of the jaw, have been recorded. More than 95 per cent of this group were World War veterans whose average age, at the present time, is 46 years. Spanish American War veterans, whose average age, at the present time, is 66 years, constitute the remainder. The age is mentioned because fractures do not heal so quickly in adults as in children. Treatments and procedures are different in many instances, and the cause of the fracture may vary somewhat between the two age groups.

For purposes of this study, fractures of the jaw will be classified as follows: 1. Fractures showing an absence of infection and little displacement. 2. Fractures showing moderate displacement associated with infection. 3. Fractures showing complications with considerable displacement and infection.

TOPOGRAPHIC REGIONS INVOLVED

More than 95 per cent of the jaw fractures mentioned are of the mandible, possibly because of its horseshoe shape and anatomic location. The region at the angle of the ramus ranks second to the area near the mental foramen in fracture location in this group. Occasionally, fractures occur at the condyle neck of the mandible.

When the jaw receives a blow sufficient to cause a fracture near the mental foramen, often a fracture occurs at the angle of the ramus on the opposite side. Such bilateral fractures frequently result from "slugging" or "holdups." Fractures of the maxillae occur anteroposteriorly, diagonally and laterally. Anteroposterior fractures of this bone usually occur near the median line.

SYMPTOMS AND DIAGNOSES

Symptoms suggesting fracture of the jaw include pain, impairment of both mastication and occlusion and displacement of the fragments, followed by edema, swelling and infection of the involved area. The temperature may rise to 102°F. or higher when there is extensive acute infections. Roentgenograms of the parts are valuable aids in fracture diagnosis, and, unless the entire bone is included in the film, the reproduction may not present a true picture of the condition. Fractures that have not been suspected have been found when the entire mandible was included in the roentgenographic examination.

CAUSATIVE FACTORS

More than 50 per cent of the patients treated at Hines Hospital for fractured jaws were slugged during holdups. Injuries received from automobile accidents held second place. Two patients had fractures of the mandible from aeroplane wrecks. The case history of one patient

From the Dental Clinic, Oral Surgery Section, U. S. Veterans Facility.

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revealed that a mandibular fracture of the first type occurred during the process of normal mastication, in the area of an impacted third molar. A roentgenogram taken of this area twenty-four hours later disclosed no noticeable pathologic condition. Removal of teeth was not recorded at any time as the cause of fracture.

TREATMENT AND PROCEDURE

Reduction, fixation and postoperative care are essential factors in the treatment of jaw fractures. Intermaxillary wiring has been a popular method of treatment of these fractures since late in the last century. This method has been much revised within the last few years, and its indications and application are well known. For simplicity and effectiveness, in the presence of teeth, this principle of treatment is more commonly indicated than other methods and it is probably most widely used.

The extensive use of elastic tension in the treatment of jaw fractures has been the greatest aid available thus far. We have utilized this procedure since 1927. The method can be satisfactorily used individually or in combination with intermaxillary wiring.

One method of reducing and fixing a fractured mandible in the region of the mental foramen, with teeth present, associated with considerable displacement and infection, will be reviewed. A constant pull by the muscles of mastication, except the external pterygoid, displaces the posterior fragment upward in such instances, but an opposite pull exists on the anterior fragment. The pull of the anterior belly of the digastric muscles, assisted by the other suprahyoid muscles, displaces this fragment downward. Therefore, the anterior teeth will be far from occlusion. By manipulation, it would be rather difficult to reduce this anterior fragment to normal apposition. A Winter type arch bar, with lugs attached, is ligated to the upper teeth. Likewise, an arch bar is attached to the teeth of the lower arch. The teeth of the posterior fragment are not yet wired to the arch bar. Rubber bands, in sufficient quantity, are placed over the lugs of the lower arch bar and attached over the lugs of the upper arch bar, the anterior fragment being thereby gradually pulled into normal position. It may require from twenty-four to forty-eight hours for this procedure. Then the teeth of the posterior fragment are ligated to the lower arch bar.

How to hold the fractured fragments in normal apposition is the next problem. This is usually done by fixing the teeth of both arches in normal occlusion until healing of the fracture ensues. Wire ligatures, silk or cotton ligatures or rubber bands may be used. Wire ligatures are not so comfortable to the patient as the others. The silk or cotton ligatures will stretch and it will be necesary to change them every five days or oftener, which is the main disadvantage. The rubber bands have proved satisfactory in many instances for holding the arches in apposition.

Elastic tension may, in the absence of wiring, be used in reducing and treating fractures of the mandible. The type of fracture just mentioned can be so treated. Metal bands, with attachments for the rubber bands, are placed over the teeth which are to be used in reduction and fixation. These rubber bands are attached over the hooks of the metal caps or bands and over the hooks of the opposite arch. The fragments will then be pulled where desired. They can be fixed by holding the teeth of both arches in apposition by means of rubber bands until the fracture heals. The teeth used should be well seated in the bone and the tension should not be too strong, as single teeth may be pulled from their sockets overnight, if the pull is too strong.

Loose teeth or those in the line of fracture should never be utilized in fracture treatment. No fixed rule is followed as

regards removal of teeth in the line of fracture or those badly loosened by the injury. Should a fracture occur in the region of the most posterior tooth of the mandible, generally this tooth should not be removed at first, as its presence prevents the posterior fragment from being displaced upward. A tooth in such a position should be retained for at least three weeks. Then, if necessary, it could be removed, and doubtless the distal fragment would not be displaced. Should this fragment be pulled upward, a small splint can be constructed to hold it in normal position. Splints of this type can be used where the arches are wired in apposition. The removal of all loose teeth in the line of fracture, unless they are badly needed to hold the fragment in position, is indicated. Their retention often results in infection.

Elastic tension can also be applied in the treatment of fractures of the maxillae. Following is a case in point: The left maxilla was fractured anteroposteriorly. The fractured fragment was displaced lingually and the teeth of this fragment were 1 cm. lingually from the lower teeth. An arch bar was ligated to the teeth of the right maxilla. The bar extended around the arch to the molar teeth on the opposite side, about 1 inch labially and buccally from the teeth of the fractured fragment. Twenty-gage wires were twisted around three teeth of the fractured fragment and the ends bent to form hooks. Elastic bands were placed over these hooks and the lugs of the arch bar. The displaced fragment was pulled into normal occlusion and then the teeth of the fractured region were ligated to the arch bar. The upper and lower teeth were then wired in apposition and were held there for four weeks, during which a union was formed.

A similar case was reduced by the same procedure. Instead of immobilizing the arches together, the operator used a horseshoe shaped vulcanite splint fitted to the palate to hold the fractured fragment in position and allowing movement of the mandible.

The rubber bands mentioned are made from rubber tubing about one-eighth inch in diameter. It must be flexible and of a good quality. The wires used to ligate the arch bars to the teeth are 25-gage and should be easy to manipulate. Wires used in making hooks for pulling and holding purposes should be about 20-gage and rather rigid. The wires should be firmly ligated around the teeth and should not impinge on the soft tissues.

Open reduction and other surgical procedures are sometimes indicated in fracture treatment. Splints of various types and head and chin appliances are also used in treating fractures of the jaw. Postoperative care should follow reduction and fixation of the fractured jaw. It is of paramount importance that adequate drainage be established and maintained in the presence of infection. More often than not, extra-oral drainage is indicated rather than intra-oral. Rubber drains in the form of tubes or strips should be inserted in the incision. They should be changed every twenty-four to forty-eight hours. The oral cavity should be kept as clean as is possible during fixation. Lung abscesses and other complications may result from oral sepsis while the arches are wired. Potassium permanganate, 1:3000, for mouth irrigation, is valuable as a cleanser and deodorant, especially in the presence of wires.

UNION OF FRACTURES

Bony union and normal function without disfigurement are the results desired in the treatment of jaw fractures. Normal occlusion is the criterion in the reduction and fixation of these parts. Only two examples of fibrous union were recorded in nearly 200 patients treated at Hines for fractured mandibles. The roentgenograms taken one year after fixation revealed the absence of bone in the fractured area. One jaw was again roentgen-

ographed a year later, but there was no apparent change. Functionally and clinically, fibrous union was in both cases normal. Both patients had tuberculosis. In other patients with this disease, fractures have healed normally. Four patients had neither fibrous nor bony union, but each fracture was several weeks old, and treatment had been instituted before the patient was received at Hines, and unusual complications were already present.

Fractured jaws should generally be reduced and fixed immediately. However, in the presence of severe infection and swelling of the parts, shock and other complications, temporary measures can be applied, in the form of application of head and chin straps, etc.; but reduction and fixation should be accomplished soon after complications have subsided.

A type two fracture of the mandible in the area of the mental foramen of five months' duration, without treatment, was included in the Hines group. By elastic tension, the displaced anterior fragment was pulled into normal position, the procedure requiring about one week. The fragments were then fixed and were held there for four months. In the meantime, bony union of the parts took place.

SUMMARY

Nearly 200 jaw fractures have been treated at the U. S. Veterans Hospital, Hines, Ill., during the past seven and one-half years. About 95 per cent of patients in this group were World War veterans whose average age at the present time is 46 years. Spanish American War veterans, whose average age at the present time is 66, constitute the remainder. More than 95 per cent of these fractures were of the mandible. The mental foramen was the most common area of fracture, the area at the angle of the ramus ranking second.

A majority of these fractures were caused by "slugging." Injuries from automobile accidents were listed as the second cause. Intermaxillary wiring, in combination with elastic tension, was the method most used in the treatment of these fractures. The average time of fixation was eight weeks, and a large majority of these fractures were infected. Union occurred in all but four instances. The fibrous union in two cases mentioned elsewhere is not included among the four cases of non-union.

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THE RÔLE OF SUGAR IN THE ETIOLOGY OF DENTAL CARIES

By PHILIP JAY, D.D.S., M.S., Ann Arbor, Mich.

DURING the past twenty years, considerable confusion has arisen concerning the rôle of diet in the control of dental caries. Before that time, it was quite generally agreed that caries was caused by the action of bacteria on food débris, with resultant production of acid, which was responsible for the actual decalcification of the tooth. More recently, it has been asserted by investigators in different parts of the world that caries could, in a measure, be controlled by improving the nutritional adequacy of the diet. Attempts to do this were made in several ways. May Mellanby[1] found that dogs raised on diets deficient in vitamins A and D and of high cereal content had hypoplastic, although not carious, teeth. She reported that, nevertheless, when children were fed diets fortified with vitamins A and D and low in cereal, the caries activity was appreciably reduced. It was concluded, from this study, then, that both vitamins A and D are essential for tooth protection against caries.

Other investigators stated that more important than vitamin D in fortifying the diet was vitamin C.[2] As a matter of fact, it was at one time believed that the addition of a pint of orange juice a day to the diet would reduce caries activity 50 per cent. Klein and McCollum[3] observed the occurrence of caries in rats on diets deficient in phosphorus. As a result of this and similar reports, the use of dicalcium phosphate for the control of caries became widespread, despite the fact that there is no clinical evidence of its value in this respect. A more inclusive view was taken by Boyd and Drain,[4] at the University of Iowa, in that they believed substantial control of caries to be possible on a diet adequate for good growth and development, including optimum amounts of all of the vitamins and a sufficient supply of minerals.

It was assumed, then, that these procedures necessarily prove that the structure of the tooth determines its susceptibility to caries and, secondly, that the structure of the erupted tooth can be influenced through nutrition. Both of these assumptions are debatable. We have little clinical evidence that hypoplastic teeth are any more susceptible to caries than are so-called normal teeth. Hypoplastic teeth may remain free from caries throughout the life of the individual; while so-called hard, well-formed teeth may become carious. There is even less evidence that the structure of the enamel, which is the first tissue attacked by caries, can be influenced through dietary change after the period of initial calcification.

Despite these inconsistencies, it is unquestionably true that caries activity has been reduced in children through dietary management. In seeking for a common basis for the beneficial results reported from the conflicting methods mentioned

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above, two facts have been brought out in bold relief: First, it is obvious, from a casual examination of the diets recommended by both British and American investigators for the control of caries, that, in all cases, the carbohydrate content has been reduced. This has not been done because the sugar or starch was considered to be important, but because it was hoped that by reducing the caloric intake in the form of highly sweetened foods, the children would be more apt, because of better appetites, to eat foods containing the substances considered nutritionally important. The first reports by Boyd and Drain were particularly notable in this regard. Their experimental group were children living on diabetic diets, which are, of course, low in sugar.

The relation of high sugar consumption to caries activity coincides with the indisputable relation between the presence of *Lactobacillus acidophilus* in the mouth and the activity of dental caries. Many observers are hesitant to ascribe a specific etiologic rôle to oral lactobacilli in this disease, but it is generally agreed that they bear a diagnostic relationship to caries activity. When these bacteria are constantly present in the mouth, dental caries invariably occurs. When they disappear, caries is arrested and no new lesions occur. It is well known that, under laboratory conditions, the growth of lactobacilli is enhanced by including sugar in the culture media. We know, too, that in individuals susceptible to dental caries, the number of lactobacilli in the saliva is proportionate to the amount of carbohydrate in the diet. It is perfectly obvious, therefore, that unless the carbohydrate content is carefully controlled, conclusions drawn from dietary studies are apt to be erroneous.

Rat studies have been complicated by the findings of Hoppert, Webber and Canniff,[5] who proved that caries can be produced in this animal only if the diet contains coarse particles. Conversely, regardless of deficiencies in the diet, caries will not occur in the rat if the ration is finely ground. This negates the conclusions of Klein and McCollum that caries occurred in their animals because of a dietary deficiency, particularly phosphorus, since the experimental diet also contained coarse particles. The same criticism applies to Lilly's[6] studies in which he reported no caries in rats fed diets that were high in sugar.

There is, therefore, a common denominator in the various dietary hypotheses so far advanced for the control of caries. First, it is seen that in practically all cases in which caries has been controlled by improving the nutritional adequacy of the diet, the carbohydrate content has also been reduced. Secondly, the restriction of carbohydrate in the diet always causes a decrease in the number of lactobacilli in the mouth, and since the lactobacilli are related to the activity of dental caries, we have here the distinct possibility that caries activity has been reduced through the decline in the growth of lactobacilli, a result of the restriction of sugar.

By some, it might be believed that lactobacillus counts are reduced because of the nutritional adequacy of the diet. This assumption is definitely negated by the fact that no matter how well the diets are supplemented with rich vitamin and mineral containing foods, if the carbohydrates are kept high the lactobacillus counts are not reduced and caries is not controlled. On the other hand, should both the carbohydrate content of the diet and the mineral and vitamin containing foods be restricted, even though the diet is grossly inadequate, the lactobacillus counts drop and caries is substantially controlled.

Those of us who have had the opportunity to follow the lactobacillus counts in the saliva of patients on high and low carbohydrate intake have been very much impressed by the rapidity with which the counts respond to variations

in carbohydrate intake. There are, nevertheless, many puzzling facts to remind us that this alone does not determine caries immunity. As an illustration, it has been observed by most clinicians that some persons are able to enjoy diets in which highly sweetened foods are eaten in large amounts with no apparent effect on the caries rate. It has also been observed that an individual may not react to high carbohydrate consumption in the same manner at different times. In some cases, the lactobacillus counts can be reduced from approximately 500,000 to less than 5,000 per cubic centimeter of saliva within two weeks on a diet in which the carbohydrate intake is restricted to 51 gm. daily. When starch is added to this diet in the form of bread and potatoes for a period of one week, the count may not necessarily rise. Indeed, the count may not rise in these cases even when sugar is added to the diet after the lactobacillus level has been kept low for from three weeks to a month.

We have in the past reported cases in which patients remained free from lactobacilli and caries after drinking a quart of acidophilus milk daily, and we have also failed, in some cases, to induce a rise in the lactobacillus counts of subjects who have never had caries by the feeding of huge amounts of candy. This all suggests that certain patients are periodically or permanently immune to caries. For them, the mere addition of sugar to the diet will not promote caries activity. It is encouraging to know that in the caries-susceptible, it may be possible to control the disease by restricting carbohydrate in the diet only periodically.

As was pointed out in the 1939 edition of "The Newer Knowledge of Nutrition," by McCollum, Orent-Keiles and Day, it is difficult to explain why the ingestion of starch and sugar does not always affect the growth of lactobacilli similarly in all individuals. We have been able to control the lactobacillus counts in some individuals by restricting sugar alone; while, in others, it has been necessary to restrict both sugar and starch in order to control the growth of these organisms.

For purposes of illustration, I cite here three individual cases:

Patients 1 and 2 are both over 40 years of age. Patient 1 had an original lactobacillus count of 600,000 per cubic centimeter of saliva. After two weeks on a diet in which the carbohydrate was restricted to 51 gm. daily, the count dropped to 450. After the addition of approximately four slices of bread a day to this diet, plus some potatoes, for a two-week period, the count dropped to 300, and, one month later, with no restriction of starch whatever, the count had gone down to zero.

Patient 2, on the other hand, had an original count of 500,000, which, on a low carbohydrate diet, dropped in two weeks to 5,000, but rose again to 16,000 after bread and milk were added to the diet. Patient 3, with a count of 25,000 on a diet unrestricted as to sugar intake, continued for five months on the same diet plus dicalcium phosphate and viosterol, during which time the *L. acidophilus* count rose to 75,000.

These observations serve to indicate that in Patients 1 and 2, caries may be controlled by restriction of carbohydrate. In the former, it is necessary to restrict merely the sugar; while, in the latter, sugar and starch both seem to be important factors. Case 3 serves to illustrate the hopelessness of attempting to control dental caries by the addition of minerals and vitamin D to an otherwise high-sugar diet.

Another point brought out by McCollum and his associates concerns the question as to why races who reputedly drink large amounts of sour milk have such a low incidence of dental caries, if it is assumed that the sour milk is acidophilus milk. This question may be answered in part by a table concerning per capita sugar intake in various parts of the world which appears on page 616

of "The Newer Knowledge of Nutrition." It will be noted that the per capita consumption of sugar in Bulgaria, and we assume that the Bulgarians are the milk drinkers referred to, is listed at 10 pounds, as compared to 110 pounds in the United States.

Reports from the Michigan laboratory during the past several years by Koehne,[7] Hubbell,[8] White,[9] Hadley,[10] Bunting[11] and me[12] indicate that there is no significant relation between the amounts of calcium and phosphorus in the blood and saliva in caries-free and caries-active patients. They demonstrated further that the pH of the saliva and blood is not a significant factor; while other reports by this group demonstrate definitely the relationship of high lactobacillus counts to caries activity and the possibility of controlling caries activity by restricting carbohydrate when the addition of minerals and vitamins has failed.

CONCLUSION

It may be safely said, from our observations, that dental caries is not a manifestation of malnutrition and that it cannot be controlled by adding minerals and vitamins to high carbohydrate diets. On the other hand, it has been observed that the lactobacillus counts can be controlled and caries activity can be reduced by the restriction of carbohydrate in either adequate or inadequate diets. We are fully aware of the fact that the adequacy of the diet is of primary importance for normal growth and development and for the maintenance of good health. From the standpoint of dental caries activity, however, we are obliged to state that control of carbohydrate consumption is the only dietary procedure . thus far demonstrated by which the disease can be controlled.

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DENTAL EDUCATION
INCLUDING A STUDY OF THE ALLEGED INFLUENCE OF DEROGATORY MEDICAL OPINION ON ITS INSTITUTIONAL INITIATION IN 1840: SUPPLEMENTARY COMMENT

By WILLIAM J. GIES, Ph.D., New York, N. Y.

IN a former paper on dental education, it was said[1]:

> The legend that derogatory medical opinion about dentistry was a decisive influence in the establishment of the first dental school did not acquire the status of a public record until it was stated, in 1904, in a paper on the "History of the Baltimore College of Dental Surgery," by a member of the faculty, William Simon, Ph.D., M.D., who wrote in part . . . that the faculty of the university [of Maryland] addressed to Dr. Harris the letter rejecting the proposition [to create a dental department in the Medical School], giving as an excuse "that *the subject of dentistry was of little consequence, and thus justified their unfavorable action.*"

On page 105 of that paper, a quotation from Cordell's "Historical Sketch of the University of Maryland School of Medicine," published thirteen years earlier (1891), indicated that a proposal to found a dental department in the University of Maryland had been "refused" for reasons that were not stated, but suggesting that "at the time referred to [1839] . . . the University was in an unsettled condition or else just emerging from it," and presumably was unable to assume additional responsibilities. On page 103 of the same paper, the present writer, supported by publications of and correspondence with J. Ben Robinson, dean of the Baltimore College of Dental Surgery, said that "no intimate records relating to the founding of the [Baltimore] College [of Dental Surgery] are available and no reference can be found in the minutes of the University of Maryland Medical School to indicate any interest it may have had [1839] in the project" [to create a dental department]. The outcome of correspondence with Dean Robinson and others, and of independent efforts, suggested the following further statement on page 109: "Diligent search for a record of that letter ['addressed to Dr. Harris'], previous to Simon's reference to it in 1904, has been unsuccessful."

Since the publication of the present writer's earlier paper, Dean Robinson, in furtherance of his careful and thorough historical studies, found a record of related comment in 1884, seven years earlier than Cordell's statement mentioned above. Dean Robinson kindly presented a copy for reproduction below.

Baltimore College of Dental Surgery[2]
(Cor. Franklin and Eutaw Sts.)

Baltimore has the honor of originating one profession, Dentistry. In its early stages, practiced in a rude, and savage manner by all kinds of quacks; and as a despised appendage of the country doctors practice. In Baltimore, the first steps were taken which have elevated Dentistry to the rank it now holds.

A graduate in medicine who had adopted dentistry as his calling, perceiving, the relations of the two professions, applied to a medical college in this city, already venerable

in the rank of schools for the formal recognition of dentistry; and the founding by that institution of a chair, or chairs of dentistry. "Dentistry indeed! A mere trade to ask for partnership with medicine." The out come of this refusal was the founding, in 1839 of the "Baltimore College of Dental Surgery" the first, and for some time the only dental college in the world; Europe being nearly thirty years behind us in this direction. This college has ever since aimed at being first and foremost as an educational institute. It has graduated *eleven hundred and sixty-eight* students, and has drawn its patronage from all parts of the United States and the West Indies, and from many countries in Europe. Its graduates are scattered all over the civilized world. They are located in nearly every city of Europe. They lead the profession in all the great centers of civilization, and have won eminence and renown in England, France, Russia, Prussia, Switzerland, Spain and Italy. They have carried the honors of the institution into Asia, Australia and the land of the Pyramids; while in every State in the United States they have established their own worth and the reputation of their Alma Mater.

This College may well point with pride to the standing of its graduates. Many of them have reached high stations in the profession; many have become renowned for their attainments, original discoveries and writings. They have met with signal honor abroad, nearly every Court-dentist in Europe being a graduate of this institution. Very many of them are men of broad culture, who have been previously trained in other high educational institutions; and, collectively, they have developed a degree of worth and usefulness which reflects the highest credit upon the College.

During the years of the existence of this school, *nineteen hundred and ninety-nine students* (1999) have attended its annual sessions.

The Baltimore College of Dental Surgery is the only dental college in the world which conducts its final examinations publicly, and with the exception of the University of Virginia, and, perhaps, the Johns Hopkins University of Baltimore, is the only American educational institution which does this. A board of visitors consisting of about eighty of the most eminent men in the dental profession are represented annually by a committee, to witness the final examinations, and advise with the Faculty as to the fitness of the candidates for graduation. It would be better still were the power to grant diplomas transferred from the Faculty to this board, as the sympathy of the professor for his deficient pupil often leads astray his cooler judgment. Much teaching and much practicing too, of dentistry, is necessary to make the practitioner capable. To merely learn the outlines of dentistry amid the struggles for a medical diploma is not a dental education. The old Baltimore school recognizes this and has in its outfit the most extensive and elaborate organization and apparatus for the study of "practical dentistry." Its buildings, infirmary, three separate laboratories, lecture hall, museum, all illustrate the statement made that "practical dentistry" is recognized as *the need;* and that he who simply knows the books, and has no dentistry in his *fingers* is, however brilliant he may be as a scholar, lacking in the one thing needful. Entering now upon its forty-fifth year of usefulness, this college, the Faculty of which has in the past, held so many distinguished names is, it is hoped, no less efficient than in former years. The experience of the past is carefully studied, and it is certain no good thing is let lapse into disuse, while careful scrutiny of the *new* that arises is constantly made.—*R. B. WINDER,* M.D., D.D.S., Dean, 140 Park Ave., Baltimore, Md.

The second paragraph of the foregoing copy of Dean Winder's statement, in 1884, contains a reference to expressed derogatory medical opinion of dentistry, the alleged "out come" of which was the establishment of the first dental school. Dean Winder's comment raises some pertinent questions:

Where were the quoted remarks previously recorded; and why, after nearly fifty years, was a definite reference to their source regarded as unnecessary authentication?

Who was the unnamed "graduate in medicine who . . . applied to a medical college," in Baltimore, "for the formal recognition of dentistry"?

Was either Horace H. Hayden or

Chapin A. Harris such a "graduate" in 1839?

Did the "graduate in medicine" make the application casually or formally, for himself or a group?

Was the "refusal" stated indifferently or responsibly, orally or in a letter "addressed to Dr. Harris," for one person or for a faculty?

Which of the medical colleges in Baltimore, in 1839, received the application and rejected it?

If such a rejection occurred, for the intimated reason, what conditions induced Dean Winder to refrain from naming the College?

In the preparation of his statement, did Dean Winder intend to record dental history or to write a college advertisement?

Were the later allusions in the publications of Cordell and of Simon, as quoted in the present writer's paper in the January issue of THE JOURNAL,[1] unacknowledged adaptations of Dean Winder's comment in 1884?

The statement quoted above was published forty-five years after the year of the alleged event. If a letter "addressed to Dr. Harris" was then a part of the records of the Baltimore College of Dental Surgery, it seems unlikely that Dean Winder would have put between quotation marks his own form of a rumor about conditions in 1839, instead of quoting from that letter.

Dean Winder's comment is so laudatory of his college that the exaggerations suggest the influence of an emotional state that was not wholly under control. The statement was published less than two years after difficulties in his college resulted in the withdrawal from his faculty of F. J. S. Gorgas and James H. Harris, and their participation with the medical faculty in the establishment (1882) of the Dental Department of the University of Maryland, which was "followed by a bitter animosity between the two institutions."[3] The publication of his comment gave Dean Winder an opportunity, in the ensuing competition, to register claims for the superiority of his independent college. Did the excitement of the then existing controversies make him more fluent in intimated disparagement of a competitor than conditions warranted, including representation of ancient rumors as alleged facts?

Nothing in Dean Winder's statement affects the validity of the summary of conclusions on page 109 in the present writer's paper in the January issue of THE JOURNAL.

CORRECTIONS

The following errors occurred in the previous paper on this general subject[1]:

Page 106, left column, third full paragraph, second line: the words ***has been*** were omitted between "historian" and "impaired."

Page 107, right column, first full paragraph, seventeenth line: The bibliographical numeral 13 should have been preceded by quotation marks; the quotation ended with the word "possess."

Page 108, left column, first full paragraph, ninth line: "Dental" should have been *Medical.*

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2. WINDER, R. B.: Medical and Dental Register of the City of Baltimore, with Medical Directory of Maryland (Edited and compiled by William H. Wilson, 1884), pp. 137-139.

3. ROBINSON, J. B.: Personal communication, January 31, 1940.

COOPERATION IN RESEARCH

By Thomas E. Moore,* B.A., M.S., Toledo, Ohio

OUR organization, composed of men who are interested in research in the field of dental materials, may be said to be representative of four lines of endeavor: (a) the Research Commission; (b) the dental schools; (c) the practicing dentist, who is primarily interested in research, and (d) industrial research men. It goes without saying that all of these groups have at least one aim in common and that is to advance the frontiers of dental knowledge, and thus to discover truths which will aid in the improvement of general health. Each one of these groups is in a unique position to carry on research which will dovetail with the contributions of the other groups. Each group can complement, and contribute to, the other groups by exchanging information and viewpoints, with the aim of integrating all contributions for the benefit of dentistry as a whole. Although this paper represents the views of the industrial group, the ideas expressed are of necessity my own. Even though some of my colleagues may differ with me regarding these views in some details, the general ideas will probably be concurred in by most of them.

Twenty years ago, when I attempted my first research for a dental manufacturer, my approach was that which one would use in chemical research; that is, to obtain first of all a complete bibliography of articles previously written upon the subject under investigation. Almost always, I found nothing in *Chemical Abstracts* pertaining to that particular problem. Similarly, surveys were made of the dental journals, the results of which were equally unsatisfactory from the standpoint of one about to attack a specific problem. No doubt, there were others who had done work on the same subject, but their work had not been published, and consequently my own work was greatly retarded. I venture to say that others who have been engaged in research on dental materials for a period of more than ten years have had similar experiences.

Those familiar with the activities of the American Chemical Society know that the articles appearing in chemical journals and papers delivered at national meetings are presented, in the majority of cases, by men in industry, who work in complete harmony with men in academic fields. Many of our important chemical developments would today be unknown had it not been for the cooperation of industrial chemical research and academic research that has existed for years.

Little of the work of chemists, physicists and engineers who have entered the field of industrial dental research has been printed in dental literature. There has been no incentive for the preparation of papers, since it has in the past been considered almost unethical for men outside the dental profession to appear on dental society programs. We have therefore been doing our work independently,

Paper presented at the meeting of the Dental Materials Group (now affiliated with the International Association of Dental Research), Chicago, Ill., February 13, 1939.

*Director of Research, The Ransom & Randolph Company, Toledo, Ohio.

with the aim of producing the best possible dental materials in our respective lines, without attempting to impart information to others, except as it might be an asset to the sale of the materials in question.

It was a source of deep gratification to the research men in dental industry when, about ten years ago, the American Dental Association Research Commission decided to make a survey of dental materials and to set up specifications for these materials. We are happy to cooperate in every possible way with this commission. Before this body was organized, little was known or taught in the dental colleges concerning dental materials and equipment for testing. The present picture is quite different, since several well equipped laboratories have been established in dental colleges, and the dental graduate is greatly interested in dental materials. We believe that this situation will be a powerful factor in the future progress of dentistry.

Interest in this subject has now spread to the practicing dentist; an added incentive to the research man of industry. I can say for the entire manufacturing group in this organization that we are deeply gratified to be included, and we are inspired with the hope of producing better materials and achieving higher goals.

WHAT WE AS MANUFACTURERS AIM TO CONTRIBUTE

The industrial group is composed of men representing various fields of chemistry, engineering, metallurgy, physics and ceramics. The number of dentists is, and probably always will be, small. However, in this group are scientists who, because they are recognized authorities in their respective fields, can bring valuable information to the other three groups, who are largely dentists. As a result of years spent in specialized fields of investigation, these research men will be able to offer the dentist solutions to his problems. He cannot be other than benefited by reading their published articles and by making personal contacts with them. We believe that we can contribute to the work of the Research Commission (1) in their work of establishing standard specifications and (2) in research that they may be conducting. We recognize the manufacturing problems involved in making materials, the importance of meeting specifications and the methods used in testing various types of dental products. In the past, some of us have been able to be of assistance to the Research Commission, but we are confident that, with the formation of the Dental Materials Group of the International Association for Dental Research, we can contribute even more. You will be enabled to contact more industrial research men and we shall all enjoy the benefit derived from closer association.

We can advise the college and professional groups as to practical research problems the solution of which will contribute to the progress of dentistry. In our daily routine, many worth-while problems arise that we cannot consider because of lack of time. Each one of us has, at present, enough of these on file to occupy considerable time of a college research staff.

We hope to convince you of our sincerity as well as that of the manufacturing organizations which we represent. When your confidence in the reputable manufacturer is infiltrated through the profession, the members of the profession will be encouraged to use only the best dental materials; which will contribute to the progress of dentistry.

WHAT WE IN INDUSTRIAL RESEARCH HOPE TO RECEIVE FROM THE PROFESSION

Through the medium of this organization, we can identify ourselves with a body of members having a common interest. We will be afforded an outlet for our papers and publications in an organization that is vitally interested in

them. The benefits will be twofold: an avoidance of duplication of labor on research problems and stimulation to greater effort and enthusiasm on the part of the research man.

We industrial research men are few and are scattered over a wide territory. Rarely are there more than two or three scientific men (exclusive of routine testing employes) in our organizations. Executives and sales people in the industry seldom have a scientific training, and this often makes it difficult to discuss our problems with them. Your discussion of these questions with the industrial research man will be invaluable to him.

HOW CAN YOUR INDIVIDUAL GROUPS CONTRIBUTE TO THE MANUFACTURERS GROUP?

1. *Research Commission.*—(a) Establishing specifications: When the Research Commission sets up specifications for a dental material, we as manufacturers have a fixed goal toward which to work. At one time, there were no standard specifications for these materials, and it was necessary for each one of us to establish his own specifications and to devise his own methods of testing. The continuation of your good work already begun will furnish us with further guideposts toward standardization. Every industrial dental research man strives to have his products come up to a high criterion of quality, but, in the absence of such a norm, he is sometimes at sea concerning the exact properties that his product should possess.

(b) Establishing standard tests: In the setting up of specifications for the various materials, it has, in practically every instance, been found necessary to develop new testing methods. There are many more types of dental products requiring specifications, and development of tests for these will be of considerable value to us.

(c) Instructing the practicing dentist so that he may better understand dental materials through your lectures and papers before national, state and local dental societies: Fifteen years ago, we industrial research men were unable to discuss properties of materials with the average dentist because we were using terms with which he was unfamiliar. Even though there is today a better understanding, you can greatly help us by continuing to expand this educational program.

(d) Helping us to raise our own standards: By the Research Commission's requirement of certain rigid specifications, and through the development of testing methods, you can stimulate us toward constantly higher standards and improved materials.

2. *The Practicing Dentist.*—We manufacturers have all had the experience of developing a material that, in our opinion, was far superior to its predecessors, yet we have found, to our surprise, that it did not meet with success. Upon analysis of the cause of failure, we discovered that the dental profession found the product unsatisfactory. We wish from you constructive criticism of our materials. You are using them every day, and your office is our best laboratory. Through your intelligent comments on the deficiencies of our products, you can be a great help in furthering improvements. Our task lies not only in improving the materials that you use, but also in making contributions toward the advancement of the science of dentistry. We shall expect you to tell us, through your papers and comments, of the materials that are vitally needed but are not now available. You, in your investigations, will develop both materials and equipment that will be helpful to us. In proceeding along these lines, it is necessary to hear the opinions and receive the criticisms of practicing dentists.

3. *The Representatives of Dental Schools.*—Many of the contributions that we shall expect from you will be duplicates of those that we have speci-

fied for the Research Commission and the profession. These, briefly, are:

(a) Development of special tests for various materials.

(b) Instruction to the student and profession regarding dental materials.

(c) Constructive criticism of our dental materials.

(d) Indication of improvements needed.

(e) Suggestions as to new materials that will contribute to the progress of dentistry.

(f) Development of new materials and equipment.

Then, too, we trust that you will present us with the valuable fund of information which you and your collaborators will obtain through your own investigations; also, when controversies arise concerning properties of materials, equipment or methods, that you may clarify the situation by checking the results of those involved.

Realizing the unalterable law of cause and effect—that law which permits us to benefit from results only to the degree in which we have contributed toward that end—I cannot too strongly plead for complete harmony and cooperation among all of us who are striving toward progress in the science of dentistry.

POWER OF STATE DENTAL BOARDS TO PASS RULES RESTRICTING ADVERTISING BY DENTISTS*

By Samuel R. Lewis, Jr., A.B., J.D., Chicago, Ill.

STATE dental boards have always had the power to adopt and enforce such rules and regulations as were necessary to enable them to carry out the purposes of the dental laws. This power was delegated to them by the state legislature through provisions in the state dental laws similar to the following one from the Georgia dental law:

S. 707. The Board shall have power . . . to make all necessary by-laws and rules for the government of said Board and the performance of its duties.

Such powers had to be delegated to the boards because it was impossible for the legislature to foresee and incorporate in the law all of the rules and regulations which might prove to be necessary for the proper administration of such laws. The legislatures did not intend to grant any discretionary power to the boards, and such rules as the boards were permitted to establish were restricted to purely procedural matters.

However, during recent years, there has been a persistent and inevitable increase in the number and the activities of all administrative boards. The dental examining boards, as well as other administrative agencies, such as commerce commissions, motor vehicle commissions, workmen's compensation commissions, medical examining boards and health

*In the October 1939 issue of The Journal, Leslie Childs discussed the right of the state legislature to regulate advertising by dentists. This article discusses more recent developments in respect to the question of regulating advertising; namely, whether the state dental board will be permitted to make rules which restrict advertising.

boards, have been affected by the trend. There has also been a definite trend toward granting more and more authority to these agencies. In the case of the dental boards, it is easy to demonstrate why this expansion has occurred. Conditions in the dental profession have been constantly and rapidly changing in respect to dental education, the number of candidates seeking admission to practice and the number and type of advertising dentists and in numerous other ways. Under these conditions, a dental law soon becomes inadequate to maintain the high standards which are demanded by the profession in order to protect the public health. It is not practical to attempt to amend the dental law to regulate every change that is made, because the legislature soon becomes indifferent to the many and frequent demands for amendment, and amendment is expensive and time consuming. Under such conditions, it is logical to give more power to the dental board so that it can change its regulations, within the spirit of the act, to maintain a consistently high standard and thereby eliminate the necessity for amending the act.

The activities of administrative boards are also closely allied to the functions of the courts. The boards conduct hearings and pass judgments on questions which would otherwise be decided by the judiciary. These duties were assumed because the slowness and ineffectiveness of the judicial system created a demand for bodies of experts whose training qualified them to settle technical problems which were too complex to be disposed of rapidly by the average judge. The boards have relieved the courts of a vast amount of work and have determined cases upon the basis of considerations drawn from other sources than the traditional ones of law. They have proved so valuable that there has also been a tendency to extend their powers in this direction. This discussion, however, will be limited to the expansion of the power of the dental boards as it relates to the sphere of the legislature and not as it relates to the judiciary.

In the process of this expansion, one of the first powers that the boards were given was the right to determine the adequacy of the dental education of each applicant, and this involved discrimination among the educational standards of the various schools. When the question of the validity of this power was brought before the courts, it was decided that, since no other body was authorized to determine which schools were acceptable, and capable of doing so, the dental board should be allowed to, as long as the determination was made without prejudice and applied uniformly to all candidates. (People ex rel. Sheppard v. Illinois State Board of Dental Examiners, 110, Illinois, 180, 1884.)

Another extension of the authority of the dental boards which was contested in court and decided in favor of the boards concerned the power to revoke dental licenses. Since the dental statutes specifically stated the only causes for which a license could be revoked, the courts were of the opinion that the board was not usurping the authority of the legislature in deciding whether a dentist's actions came within this prohibition. The courts have declared that as long as the offender is given a fair hearing and has a right to appeal to a court of law if he believes that the decision is unfair, such statutes are constitutional.

The most recent development in connection with the extension of state dental board powers concerns the question whether the boards shall have the power to pass regulations regarding advertising by dentists. Since it was only recently that, after a number of conflicting state court decisions, the Supreme Court of the United States upheld the right of the state legislatures to regulate advertising (Semler v. Oregon, Ore., 1935), it is interesting that the legislatures, so shortly

after their own authority had been recognized, passed laws which delegate some of these powers to the dental board.

The power to make a rule prohibiting a certain type of advertising means that the dental examining board instead of the legislature can prescribe what a dentist shall or shall not do while he is actually in practice. This is a different type of authority from any that had previously been given to the board, and one that both the legislature and the courts could be expected to consider critically.

When considered from the standpoint of the historical expansion of the regulatory powers of dental boards, the regulation of advertising is merely an extension of the previous development. Both the courts and the legislature recognize the value of permitting the board to make rules which keep abreast of the rapid changes in types of advertising. The board can, if necessary, change its rules as fast as methods for evading them are devised. This flexibility enables the board to maintain more adequate standards for the protection of the health of the public than the legislatures can. Perhaps the legislatures had this in mind when they authorized the dental boards to establish regulations regarding advertising. Furthermore, in the decisions which have already been rendered, the courts appear to be willing to give the boards as much authority as a reasonable construction of the legislative provisions will permit.

One of the first cases regarding this question of the right of the dental board to restrict advertising arose in 1932 in New York. The court was asked to pass upon the validity of two rules restricting advertising which had been passed by the board of regents under the authority conferred by the dental law. The rules in question prohibited:

1. Any advertising statements of a character tending to deceive or mislead the public.

4. Advertising by means of a large display, glaring, illuminated or flickering light signs.

In its opinion, the court said that the board was authorized by the dental law to guard "the policies of the state in relation to curbing deception or fraud by those subject to its supervision," and to "prescribe canons by which conduct deemed by it in the exercise of fair judgment, to be unprofessional and objectionable may, in the interest of rescuing that profession from vulgar commercialism, be banned." (Dr. Bloom Dentist, Inc. v. Cruise, 259, N. Y., 358, 182, N. E., 16, 1932.)

This decision might be interpreted as meaning that the board of regents could prescribe canons that banned any unprofessional and objectionable conduct, but it will be seen that this was not what the court intended. Two years later, the validity of another rule which had been passed by the board was contested, and the case came before the court which had rendered the previous decision. The rule which was questioned in this case prohibited the following types of advertising:

8. The employment of letters, handbills, posters, circulars, cards, stereopticon slides, motion pictures, radios, newspapers and other advertising devices for the purpose of soliciting patronage, except that a dentist may use personal professional cards of a modest type announcing his name, title, address, telephone number and office hours.

In this decision, the court said that the rule was invalid because it exceeded the authority which the legislature had delegated to the board and that the rule constituted a usurpation of the right of the legislature to control the practice of dentistry. (Brown v. University of the State of New York, 273, N. Y., 809).

From a realistic viewpoint, it is difficult to see where there is such a radical difference between this rule and the ones which had been approved in the previous opinion of the court. The interpretation of the intent of the legislature which the court had adopted required it to

place limits on the regulatory powers of the board and made it almost impossible to avoid an arbitrary distinction such as this. If the court had not drawn the line at this point, it would probably have become increasingly difficult to make a distinction between the various rules.

It is interesting to note that two of the judges disagreed with the majority of the court and were of the opinion that if the board was to be permitted to make any rules regulating advertising, it should also be permitted to decide how strict these rules should be, and that the majority was not justified in making a distinction between the degree of restriction in the rules when the important question was whether the board should have the authority to regulate it at all.

Other states have had similar decisions on this question. The Wisconsin Board of Dental Examiners, under the authority of the dental practice act, passed a number of rules restricting advertising, the validity of which was contested in court. In this case, the court said that some of the rules were valid and some were invalid. (Modern System Dentists Inc. v. State Board of Dental Examiners, 256, N. W., 922.) Thus, the Wisconsin court used almost the same reasoning as the New York court did in the two cases previously discussed. It said that the legislature could delegate its power to regulate advertising to the state dental board, but that some of the rules which the board had passed were within the authority which had been delegated and some were not. The outcome was similar in the Iowa case of Craven v. Bierring (269, N. W., 801, 1936), wherein the court said that some of the advertising restrictions were valid, while others were not within the power of the board.

A somewhat different point of view was expressed in a recent Pennsylvania case which has come to our attention. Although the decision is not by a court of last resort and the judgment may be reversed if the case is appealed, it is illustrative of what appears to be a more liberal approach to the question and may be an indication of the way this question will be decided in the future. At any rate, it is very pertinent to this discussion and contains some interesting statements. The rules of the board in this case, all directed toward control of the size and type of signs which dentists could use, were as follows

(1) A licensee shall have the right to exhibit a sign which shall be in height no greater than 6 inches and which shall be no longer than is necessary to contain his or her name and degree or the word "dentist" or "dental hygienist" or any abbreviation thereof. Such sign shall be horizontal and may be illuminated, provided there shall be no border consisting of a light or lights surrounding such sign and that no flashing or intermittent light be used in connection therewith.

(2) A licensee may display one such sign at the street entrance of the building in which his or her office is located, and if his or her office is on a floor above street level, he or she may display one such sign on his or her office window.

(3) The name of the licensee appearing on such sign or signs must coincide with the name as it appears on his or her license or registration card, provided, however, the initials of the given names may be used.

(4) No display case shall be maintained by a licensee outside the office of such licensee.

The plaintiff admitted that he had violated all of the foregoing rules, but alleged that the board had no power to make those rules and that they were unconstitutional and void. The court stated to begin with that there was no question about the right of the state to regulate advertising by dentists in the interests of public health. With respect to the right of the board to do so, the court said:

A legislature in enacting a law, complete in itself, designed to accomplish the regulations of particular matters following within its jurisdiction, may expressly authorize an administrative commission within definite

valid limitations to provide rules and regulations for the complete operation and enforcement of the law within its expressed general purpose. These powers may be conferred upon administrative bodies in the same manner that they are conferred upon executive officers.

We think administrative boards have the right to adopt rules and regulations in order to see that the legislative will expressed in statutory form is carried out by the persons over whom such board may have administrative power. And an administrative body may interpret the statute which confers upon it duties and functions, and its construction is persuasive upon the court because it is the body entrusted with the execution of the statute.

The court then discussed the validity of each rule in relation to the authority conferred upon the board and made the following concluding statement:

We are of opinion therefore that the Dental Law of 1933 as amended does not violate the Constitutions of Pennsylvania or of the United States; that the defendant Board has the power and authority to make rules and regulations complained of; that said regulations are not unconstitutional; and that they are necessary and reasonable regulations, and within the provisions of the Dental Law as amended, for the protection of this public health, safety, morals and welfare of the people of this Commonwealth.

In all of the cases which have been previously discussed, the board rules were made under a more or less specific authority stated in the dental law. In this case, they were made under the authority of the following clause:

To adopt, promulgate and enforce such rules and regulations as may be deemed necessary by the board and proper to carry into effect the powers hereby conferred.

As was said earlier, nearly every state dental law has contained a clause similar to this one, ever since the first effective dental laws were adopted. If this decision is an indication of the attitude which may be adopted in other states, it will be unnecessary to request the legislatures to enact clauses which specifically state that the board shall have the right to pass rules which restrict advertising.

It is unlikely that all of the other state courts will reach the same conclusion as this Pennsylvania court, particularly in view of the fact that New York, Wisconsin and Iowa have already indicated that they will not permit certain rules of the board even under a more specific clause than the Pennsylvania one. Nevertheless, the Pennsylvania case appears to be more consistent with the previous developments of the dental board powers and does not result in the confusing distinctions which the other decisions have already made.

Unless there is a sudden change in the trend toward the extension of the authority of administrative boards, cases on this subject will continue to arise. It should prove interesting to see whether the courts follow the path of prompt recognition or one in which they permit a gradual extension by examining carefully each new rule. The recent Pennsylvania decision indicates that both points of view have already been expressed, but it is doubtful whether many states will follow the Pennsylvania decision, in view of the fact that the expansion of the powers of the boards involves a number of important legal questions. The courts may be expected to be increasingly hesitant about permitting further expansion of dental board powers.

212 East Superior Street.

MAIL ORDER ORTHODONTICS

By Charles R. Baker, D.D.S., F.A.C.D., Evanston, Ill.

DURING the past quarter of a century, the public has shown an increasing interest in dental problems. The laity not only appreciates the proper care and treatment of individual teeth and diseased tissues of the oral cavity, but it also realizes the value of a normally functioning chewing apparatus and understands the serious handicap of malocclusion of the teeth with its associated facial deformities.

However, experienced orthodontists are led to believe that the average member of the dental profession is not sufficiently interested in the problems involved in malocclusion, nor does he seriously consider the obligations that he must assume in corrective treatment. According to R. C. Willett[1]:

> The present-day scope of orthodontics is not generally appreciated. It embraces far more than the corrections of irregularities in the positions of teeth, and restoration of occlusal relations for the mastication of food. While it is true that orthodontics is primarily concerned with the normal development of the dental arches and occlusion, it is also directly concerned, through the proximity of structures and interrelationship of function, with the internal and external face, and indirectly with the functions of digestion, nutrition, respiration and speech, and through these structures and functions, with the health of the body as a whole. . . . The general practitioner's attention should be first centralized upon the recognition of the supreme importance of prevention and interception of malocclusion in its incipiency rather than upon the complexities of advanced types which should be a matter of secondary consideration.

In recent years, the evolution of dental education has led to many curricular changes in undergraduate instruction, and although there is now more comprehensive teaching in orthodontics, the limited time available for this subject is not sufficient to prepare the student for capable orthodontic practice. This fact is recognized by the various schools, thirteen of the thirty-nine dental schools now offering graduate courses in orthodontics of one scholastic year. These courses are generally well attended, some students spending half time for two years in order to take advantage of the opportunity for greater clinical experience.

A number of state dental examining boards require that a dentist pass a special examination and procure a specialist's license in order to present himself legally to the public as a specialist in orthodontics.

The directors of the American Board of Orthodontics, which is an examining body authorized to grant certificates of qualification, are pleased to observe that the majority of applicants for certificates have records of graduate and postgraduate work. Orthodontists generally advise young men who are seriously considering the practice of orthodontics to take a graduate course of one year as a minimum educational qualification.

Research, study, clinical practice and careful posttreatment observations over long periods have done much for the progress of orthodontics and are responsible for numerous changes in concepts

Read before the Section on Orthodontia at the Eighty-First Annual Session of the American Dental Association, Milwaukee, Wis., July 19, 1939.

of the problems involved and for new methods of treatment.

Notwithstanding these well-known facts, articles continue to appear in dental journals which tend to minimize the importance of a thorough preparation for orthodontic practice and to encourage readers to enter this field of activity. A recent writer said that "orthodontia is easy." He also suggested, and I am told that many dentists hold the same idea, that the orthodontist attempts to keep secret his knowledge and methods for his personal advantage.

Nothing could be farther from the truth. I feel safe in saying that no class of members of the dental profession has contributed more in valuable time and effort in order to assist fellow practitioners than have the orthodontists.

Records of dental meetings indicate that the average general practitioner is not particularly interested in hearing a program devoted to orthodontics, although it may have been prepared especially for his consideration.

The increased interest of the public in the correction of malocclusion has stimulated many general practitioners to enter this field of practice. It was not uncommon, just a few years ago, to see dentists take plaster casts (usually of the maxillary jaw only) to dental supply houses and have a salesman decide as to the bands, arch wires, etc., that should be used. Sometimes, the salesman also offered advice concerning the extraction of certain teeth and gave directions as to the technical procedures incident to the orthodontic treatment.

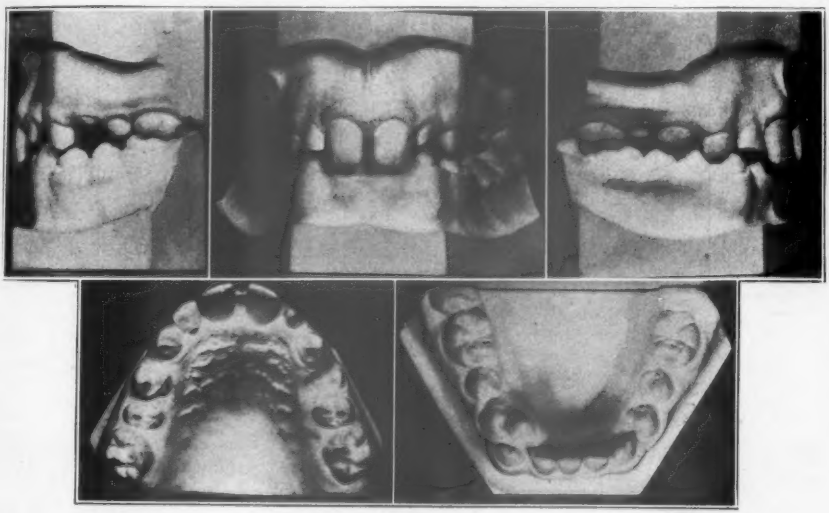

Fig. 1.—Set of casts sent to laboratories. It will be noted that this is an Angle Class I (neutroclusion) case; which indicates that the mesiodistal arch relationship is normal. The permanent maxillary left lateral incisor is peg-shaped. The mandibular right lateral incisor is in complete linguoversion.

The following is taken from an article which appeared recently in a trade dental journal:

ORTHODONTIA AND THE GENERAL PRACTITIONER[2]

There is nothing particularly difficult about the average orthodontia case. Usually it involves nothing more than the application of certain well founded mechanical principles.

Any dentist who is sufficiently interested in preparing himself to practice orthodontia can obtain the necessary background for this work through the study of recognized text books on the subject, through study clubs and friendly guidance and help from others whose experience qualifies them to capably perform orthodontia services. Among the latter are those dental laboratories and dental technicians who are thoroughly familiar with the construction of orthodontic appliances and capable of planning the proper construction of the appliance best suited for the particular case involved. If furnished with good study models and an accurate bite the dental laboratory can contribute both co-operation and invaluable suggestions to the dentist before the case is actually started.

To properly carry through an orthodontia case, only a few minutes time at each appointment is required. Although the appointments may be quite frequent and extend over a long period of time, they can usually be "sandwiched" in very conveniently.

The article continues with advice regarding fees, with suggestions as to the amount to be charged and the method of collecting the fee.

No doubt you have noticed that certain dental journals carry advertisements of laboratories and of technicians who offer to make orthodontic appliances, and some agree to give instructions covering the treatment of malocclusion. Similar advertisements are received through the mail. Here are a few of them.

A. ORTHODONTIA SIMPLIFIED.
Dear Doctor:

We are offering dentists the opportunity to handle their own orthodontic cases. We furnish stainless chromium appliances at $10.00 per arch. Full instructions on each case by expert of 25 years experience. We guarantee satisfactory results.

B. ORTHODONTIC TECHNICIAN WISHES TO ANNOUNCE THAT HE IS NOW IN A POSITION TO MAKE YOUR ORTHODONTIC APPLIANCES.
Over twenty years experience.
I AM AT THE .... BUILDING.

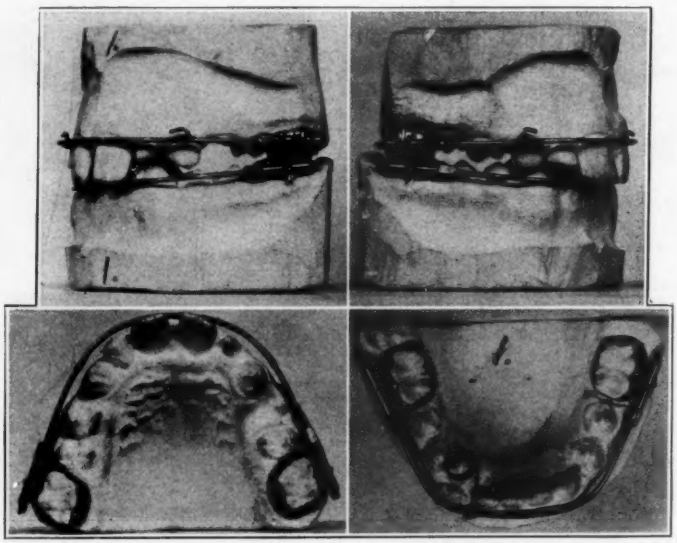

Fig. 2.—First set of appliances received. Hooks are provided for the use of intermaxillary elastics in both horizontal and vertical directions. The requirements of the case do not include the use of these elastics. The mandibular appliance is entirely inadequate.

C.

DO YOU TAKE CARE OF THE DENTAL NEEDS OF THE ENTIRE FAMILY?

We give special attention to making Jackson REGULATING APPLIANCES. Stone models preferred with orders. Price $7.00, Gold Plated, $8.00

A SIMPLE WAY TO OVERCOME A BAD OVERBITE.

FOR THESE AND MANY OTHER PROBLEMS, WE WILL BE PLEASED TO OFFER SUGGESTIONS TO ENABLE YOU TO ACCOMPLISH THE DESIRED RESULTS.

It should be the purpose of the orthodontist as well as of the general dental practitioner to recommend early treatment of irregularities of the teeth and facial deformities. For many years we have been constructing Regulating Appliances for this treatment. The early lateral expansion of the dental arch for the free accommodation of the permanent teeth is recommended for the purpose of improving the general occlusion of these teeth and at the same time, for increasing nasal space. The design of the ap-

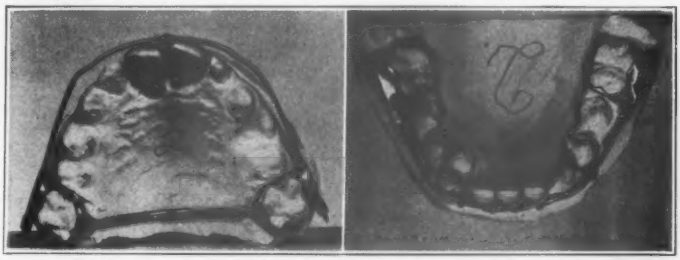

Fig. 3.—Second set of appliances. The maxillary appliance has a very poorly fitting labial arch wire with nuts unexpectedly placed at the distal ends of the molar tubes. There is a transverse palatal bar soldered to the molar bands, a device which the author has never seen used by an orthodontist. The mandibular appliance is inadequate.

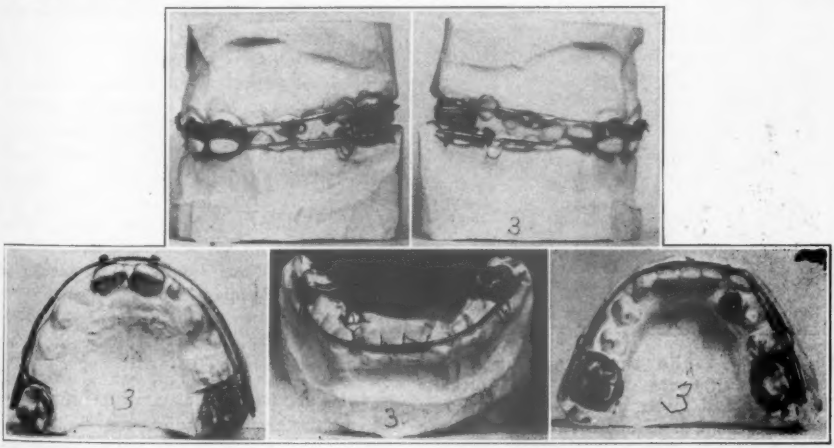

Fig. 4.—Third set of appliances. This mechanism was also equipped with unnecessary hooks for intermaxillary elastics and was inadequate in other respects.

TO MOVE ONE OR MORE TEETH THAT ARE INSIDE OR OUTSIDE THE BITE.

TO MOVE THE LOWER JAW FORWARD OR BACKWARD.

TO SPREAD THE BICUSPID REGION ONLY, TO MAKE ROOM FOR THE ANTERIOR TEETH.

pliances should be such as to permit at will the movement of any of the teeth in the arch in the required direction.

In making these appliances, all details should be noted carefully and the appliance properly constructed to do the work. The Knowledge and Skill in making the appliances is of great importance to the profession.

We have been doing this ever since Dr. Jackson first gave to the Dental Profession his regulating system over thirty years ago.

The Stainless Jackson APPLIANCE is far superior to any of the other Jackson appliances.

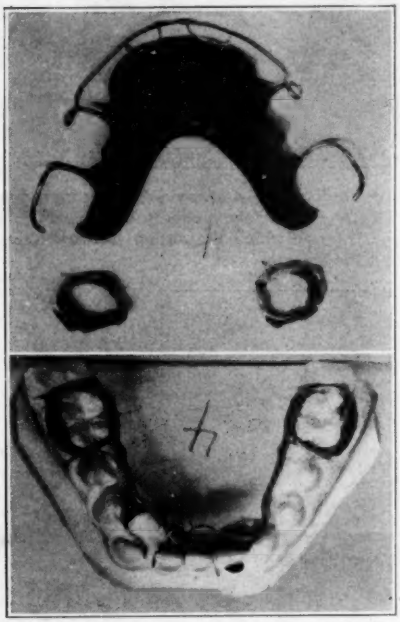

Fig. 5.—Fourth set of appliances. The maxillary appliance consisted of a vulcanite bite-plate and molar bands with buccal lugs for its retention. The mandibular appliance was a lingual base wire soldered to molar bands and having several soldered finger springs intended to move the anterior teeth.

The wires are of a smaller gauge, and are much stronger, eliminating the need of many repairs.

Actually these wires become stronger by bending them.

There is less bulk in the mouth, and they are clean at all times.

In most cases the original appliance can be used as a retainer.

D.

MINIMUM PRESSURE NEEDED WITH .... APPLIANCES.

Because .... appliances are unusually resilient it is possible to secure the most potential movement with the least pressure.

All appliances guaranteed as to workmanship and materials. Send your next case to .... Reasonable prices.

E.

ORTHODONTIA.

You can double your income without any new patients, just by telling them that you do orthodontia. In nearly every family there are one or two children that need orthodontia help ....

... ORTHODONTIA Service includes the designing and the complete construction of the proper corrective appliance as indicated for each individual. We do not use stock appliances nor do we use the same design for each case. Simplicity of design and application assures you ease in manipulation and adjustment in the mouth. A periodic check-up by you assists proper functioning. Complete written instructions as to the insertion and manipulation of each ... made orthodontic structure are sent with the appliance. There is no mystery about orthodontia. It is an exact science that will accomplish gratifying results if you permit us to make your appliances.

... orthodontia appliances and service are very economical compared with the marvelous results obtained.

In order to obtain accurate knowledge of what these agencies are doing, the Chicago Association of Orthodontists decided to investigate the matter. Plaster casts of a case of malocclusion were sent by general practitioners to a number of laboratories and technicians, and appliances were ordered. Instructions concerning treatment were also requested. Some of the laboratories were located in the larger cities and others in small towns.

On receipt of the first set of appliances, the following instructions were sent:

Dear Doctor:

In this case to clear ant. teeth it will be necessary to elongate the molars. We are placing hooks on buccal tubes for rubber bands, which must be kept on constantly until bite is opened. Would suggest that you leave appliances on model until ready to cement bands then take one band at a time and cement as you would a crown (from model to tooth) so as not to get bands misplaced. (a sheet of base plate wax sealed over occlusal of band will insure good cementation. Set the four molar bands at first sitting only. Do not try to place arch bar until next sitting.

We have placed intermaxillary hooks on upper arch bar for retrusion of upper ant. later!! We would suggest you keeping in touch with us as a case progresses and we will give you further instruction.

On receipt of the second set of appliances, the following instructions were sent:

Dear Dr._____:

When you receive your orthodontia appliances, you will find that they are ligated to the models with brass wires.

We suggest that you ligate them in the mouth in exactly the same way, using brass or stainless steel ligature wire.

It will be necessary for you to see your patient twice a week for several weeks and later on, perhaps you can cut this down to once a week.

It is simply necessary to see that the ligature is fairly tight at all times. The movement of the teeth will be accomplished by tightening the nuts by giving them a partial turn each time the patient comes in. The patient will help you determine the amount, by telling you if there seems to be too much pressure—or not enough.

Of course, if one of the ligature wires should slip off or break, the patient should immediately report to you.

In six or eight weeks, if you will take impressions with the appliances in place and send those to us along with the original models, we'll be glad to write you again, making any suggestions which may seem in order at that time.

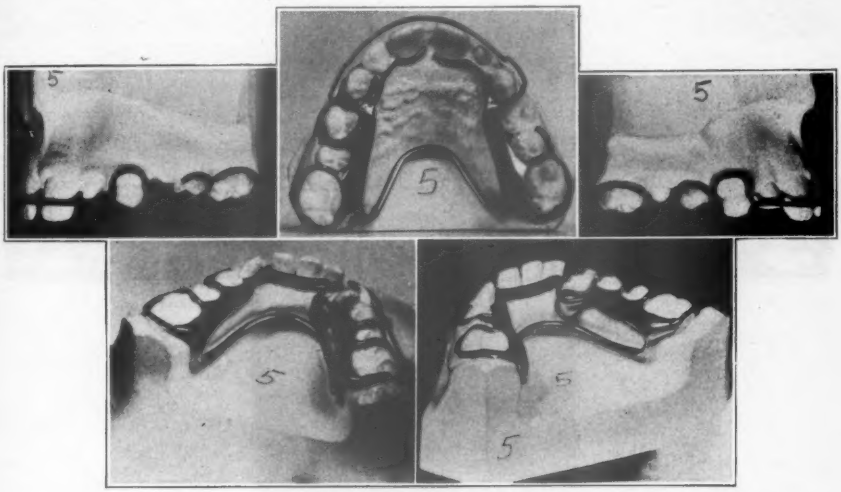

Fig. 6.—Fifth set of appliances.

The instructions based on the third set of appliances were so lengthy and contained so much that was irrelevant, with numerous repetitions, that I shall not take the time to present them.

Only a super-optimist would expect satisfactory results from the use of the

fourth set of appliances. The following letter was received regarding the case:

Dear Dr.:

In regards to the models of your case for orthodontia. We always start these cases with a bite plate to open the bite, this is put on the upper. it has two molar bands two clasps at the molar region on buccal sides, and a wire across the front, with a looped spring to move left central mesieally and a rubber vulcanite horseshoe in lingual of upper. On lower either a solered lingual arch or removable with bands on molars, and finger springs to move left. first bicuspid to the left also cuspid, lateral and centrals. and a spring to move right lateral up in line with the other teeth. this can be done while the with looped springs to move first bicuspid up on the right side and cuspid up on left side. and left central mesially from looped springs on labial arch. but the bite should be opened first with a bite plate this is the best way to correct this over bite. these bite plates are worn until posterors touch each other molars, upper and lower.

The following note was added:

then rubber will have to be added after this it will have to be worn six months.

The following instructions were received. They were written in pencil on a bill-head:

on this case the bite plate is set so as to

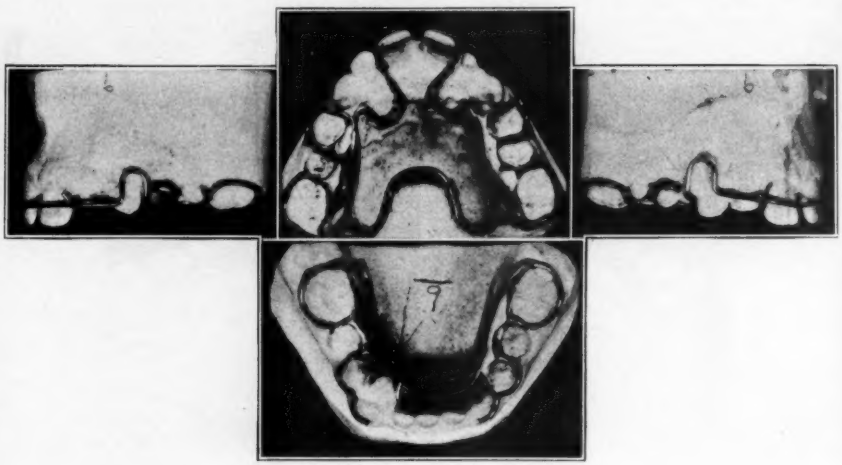

Fig. 7.—Sixth set of appliances.

bite plate is being on the upper. this appliance will cost sixteen dollars for removable lingual arch on lower and bite plate on upper. solerd lingual on lower will be two dollars less this is of Chrome metal peciuss metal would be twice as much.

The foregoing was written in ink. The following was added in pencil.

this bite plate [which was enclosed] is a sample of the kind that will be used on this case. that is if you want this. other wise we can fit a appliance of another kind labial arch molar bands linguel wire up to cuspids move the anteriorres back and together this will work for about two or three weeks. after this all you do is squeeze the looped sides of front wire together this will have a backward pull and take a little rubber away from the front teeth about 1/16 of inch and keep doing this untill you have upper front teeth where you want them. do not take to much rubber away because the gum will get sore. on lower these springs are set to move these teeth for about two or three weeks. so when ever you want more pressure just squeeze looped springs together a little at a time so you do not get to much pressure on the

springs at the sides just pull them at the front out away from heavy wire this will move the cuspids out bucally and first bicuspids.

but do not put to much pressure on these springs and upper front wire on bite plate put the appliances on loose for about ten or fifteen minutes so the child can tell if it

about every thee or four months take new impressions and study over case or send in to me.

This set of appliances and instructions were from the man whose advertisement read "OVER TWENTY YEARS EXPERIENCE."

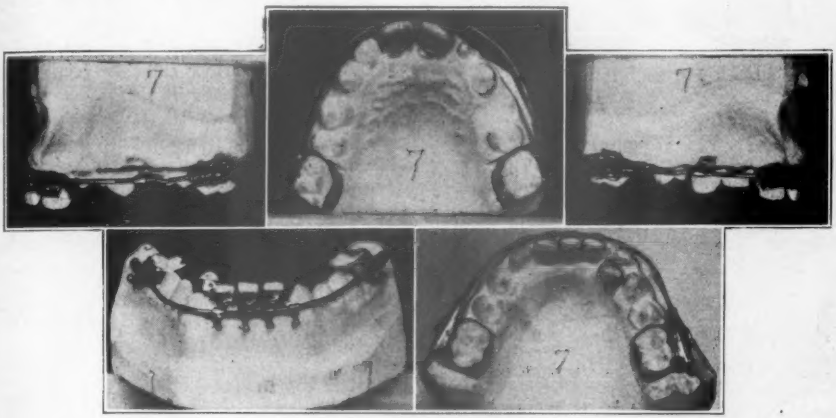

Fig. 8.—Seventh set of appliances.

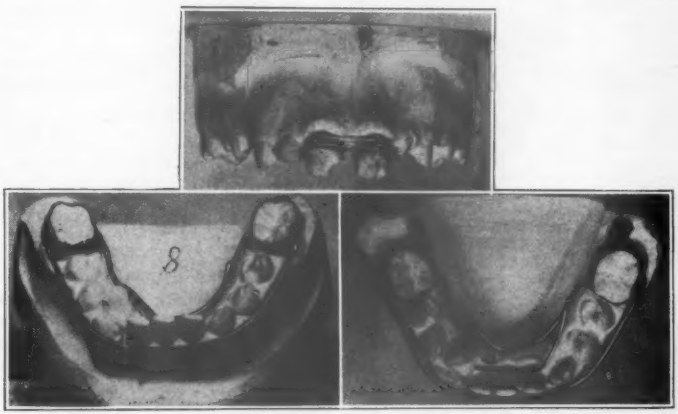

Fig. 9.—Eighth set of appliances.

is to much pressure. first put on the upper and about two weeks the lower.

Added notes of instruction).

if any of these springs brake off just send in the appliance or biteplate and will put on new ones no charge.

make record models before you strat.

The fifth set were Jackson appliances, removable by the patient. I do not know a single orthodontist who would consider using such a mechanism.

The instructions received were as follows:

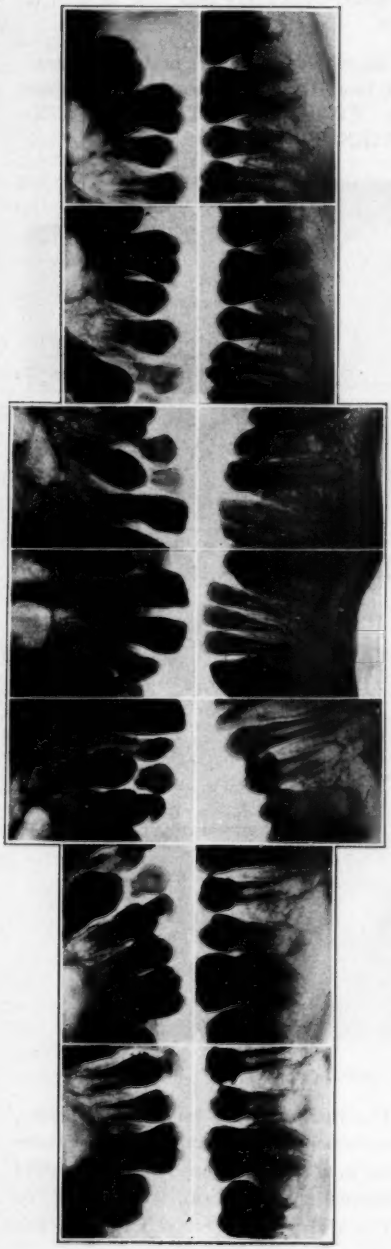

Fig. 10.—Full mouth roentgenograms showing that permanent maxillary right lateral incisor is missing.

Dear Doctor:

In reply to your letter of November 22nd, we have constructed the upper and lower German Silver Jackson appliances, and you will find separate wires on the lower to move the right Lateral mesially, and the right Cuspid distally, and the usual finger wires to move the Anteriors as you desire.

We did not attach the outside wire to the lower so as to allow free movement of these Anterior teeth. This seems like a simple case of bending the wires sufficiently to bring pressure on the teeth in the direction you desire to move them. All of the wires are to be bent (Out Of The Mouth), and when the appliances are inserted these wires will snap up against the teeth and the spring in the wire will do the moving.

The sixth set also were Jackson appliances, removable by the patient. They are inadequate.

The instructions received were as follows:

My dear Doctor:

Upper: Centrals to be pulled together. lower: anteriors to be pushed to left side. in this better the median division and also provide space for lower right lateral to be pushed in the arch.

The seventh set of appliances were inadequate and were provided with hooks for unnecessary intermaxillary elastics.

The laboratory did not furnish any instructions, evidently assuming that they were not necessary. The following is quoted from a letter received regarding the case:

We do not believe you will find a great deal of difference in adjusting this case, in as much as your molars are normal occlusion, however, care will have to be taken in moving the lower right lateral forward. We noticed it is a peg lateral on this case on the upper left lateral. We would also like to know if the upper right lateral is a disciduous tooth.

A later letter contained the following:

Up to this time we have received no word from you and we are wondering if for any reason we have either not made ourselves clear or if the price did not fit your patients pocketbook.

Possibly if you would let us know approximately how much you would care to put into these cases we can work something out to your satisfaction.

In the eighth set, the maxillary appliance consists of individual bands on the central incisors. The mandibular appliance consists of a labial arch wire and a lingual arch wire, both of which are soldered to the molar bands. The lingual arch wire carries finger springs intended for tooth movement. However, the soldered labial arch wire is so adapted that to move the anterior teeth into normal positions is impossible; a most inadequate appliance.

The instructions received were as follows:

Dear Doctor_____:

We were of the opinion that instructions were sent to you for the upper and lower regulating appliances.

However, we suggest that you try to bring the two centrals together by tying them on the two hooks soldered to the labial of the bands. When that has been accomplished, take an impression with the two bands in position, and we will solder them together to act as a retainer for four or five months.

On the lower, you will note that we have a spring wire on the left running over the cuspid, lateral, and the two centrals. This spring wire is to be used to force these teeth into place by pressing it on the lingual. The same applies to the lateral on the right side.

In addition to that, you may also ligate the anterior teeth to the labial bar.

If there is any further information you desire, please communicate with us.

The following is a brief history submitted by the orthodontist who treated the case:

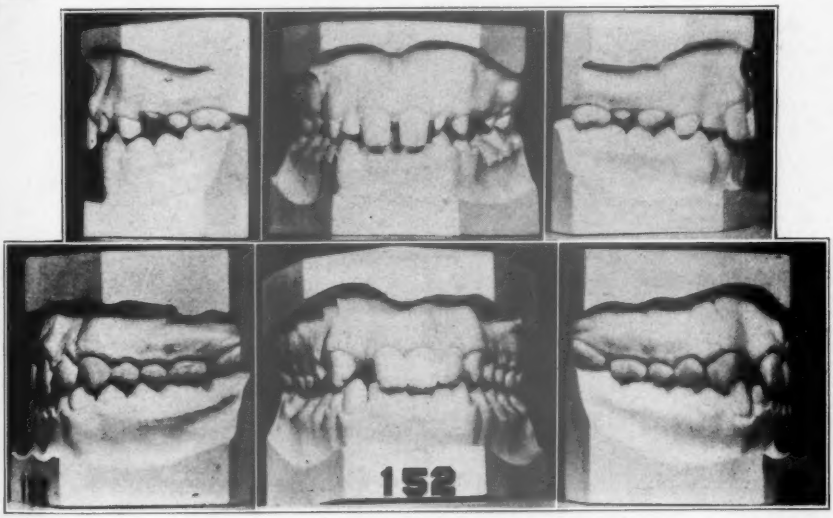

Fig. 11.—Casts of case before and after treatment.

October 1935. Patient eleven years old. General physical condition good except for hay fever, which caused abnormal respiration. Adenoids and tonsils were removed at the age of five.

Full mouth Roentgenograms revealed the absence of the permanent maxillary right lateral incisor. The permanent maxillary left lateral incisor is peg-shaped. It was decided to use a porcelain jacket crown on the left lateral incisor and to supply an artificial substitute for the right lateral incisor after completion of the orthodontic treatment.

Requirements of corrective orthodontic treatment: To eliminate the space between

the maxillary central incisors and to depress these two teeth. Due [sic] to the absence of the permanent maxillary right lateral incisor, the cuspid was developing in a position to erupt to the mesial of its normal position. The cuspid, therefore, should be moved distally upon its eruption.

In the mandibular arch, the right lateral incisor was in complete linguoversion and the other incisors were to the right of their normal positions. It was necessary to develop the size of the arch and to place the right lateral incisor in correct position. Bodily movement of the mandibular incisors was necessary; that is, the roots as well as the crowns of these teeth must be moved laterally through the alveolar process. It was also necessary to rotate the right cuspid.

Appliances. Molar bands with buccal tubes and .040 wire lingual extensions were used on the four permanent first molars. Attachment bands carrying McCoy open tubes were used on the maxillary central incisors. Similar attachment bands, with McCoy open tubes were used on the mandibular central incisors, left lateral incisor and cuspid. A cast overlay, carrying a McCoy open tube was used on the right cuspid, which had not fully erupted. Arch wires with .040 end sections, carrying loop springs for adjustment, and anterior sections of .022 wire were applied and adjusted so as to fit properly into the open tubes.

Treatment. The maxillary arch wire was fitted so as to depress the central incisors, which were moved together with silk ligatures. The use of the open tubes prevented a mesial inclination of these teeth; they were moved bodily. When the right cuspid began to erupt, a finger spring was added to the appliance to guide it into a more favorable position. Later, the use of an attachment band was necessary in order to complete the movement.

In the mandibular arch, the first step was to move the left cuspid buccally. This provided space to the distal of the left lateral incisor. Spurs were soldered to the arch wire at correct locations for the attachment of silk ligatures, which moved the left lateral incisor and the central incisors to the left. These teeth were moved bodily. The right cuspid was rotated into a normal position. There was now sufficient space for the right lateral incisor and it was moved into correct alignment and position by the use of an attachment band and silk ligatures.

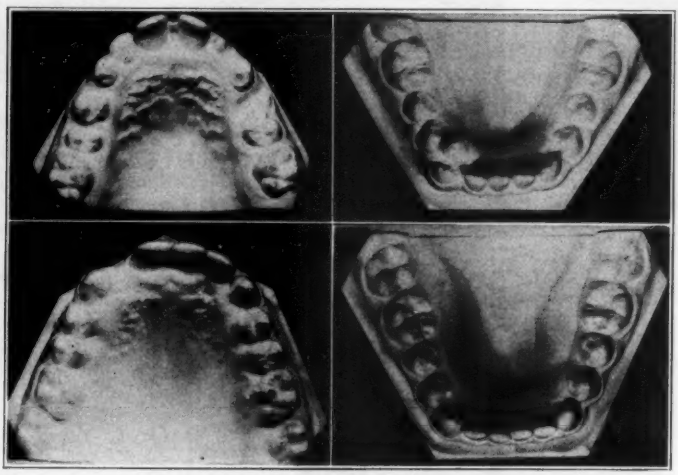

Fig. 12.—Occlusal views of case before and after treatment.

The corrective treatment of this case required eighteen months.

Retaining appliances. A maxillary Hawley vulcanite retainer was used, which carried an artificial right lateral incisor. The man-

dibular teeth were retained by bands on the cuspids and a soldered lingual wire. The Hawley retainer will be worn until it is considered advisable to exchange it for some means of supplying a permanent substitute for the missing lateral incisor.

The final impressions were taken eighteen months after the completion of the corrective treatment.

The excellent result achieved in this case was due to the fact that the operator was qualified by education and experience to make a diagnosis and to plan and conduct the treatment. Each phase of the treatment was carried out efficiently and in logical order. Therefore, the patient received excellent professional service, with a minimum of annoyance and inconvenience.

Although there is no standard routine among orthodontists in the examination of patients, diagnosis of existing conditions, analysis of cases and determination of the correct time for treatment, all of which must be seriously considered before a plan of treatment, including the use of appliances and possibly corrective exercises, can be adopted, the following items may logically be considered as minimum requirements: 1. Personal examination of the patient. 2. A written history of the case. 3. Accurate casts of the teeth. 4. Full mouth roentgenograms. In addition, the use of photography, both as an aid in diagnosis and as a matter of record, is now practically universal. Some orthodontists also use a gnathostatic record and other methods of studying the relation of the dental arches to the cranium.

Fig. 13.—Facial photographs of patient before and after treatment.

The four items mentioned above are essential to an intelligent consideration of the appliances necessary and appropriate for corrective treatment. It is interesting to note that all the laboratories involved made their appliances with no understanding of the case except what they could learn from the casts. None of them inquired about full-mouth roentgenograms, although one did suggest that the permanent mandibular right lateral incisor might possibly be a supernumerary tooth.

One of the primary requirements of treatment in this case was the bodily movement of the mandibular incisors. Not one of the appliances received was constructed for this purpose.

The use of any of these laboratory-made mechanisms would certainly have resulted in disappointment to the patient, who would have contributed his time and money and would also have had the inconvenience of wearing them. Likewise, the result would not have been to the credit of the operator.

I shall read you excerpts from a recent editorial by Leuman M. Waugh,[3] which is well worth consideration at this time:

An orthodontic appliance is potent either for good or harm in the mouth. It has no inherent intelligence and can act only as mechanically directed. It cannot be beneficial unless it is correctly adjusted and this depends wholly on the intelligence and skill of the operator. If the appliance remains passive without regular adjustment and cleansing of the teeth, it is potent for harm to the patient and, therefore, to the dentist.

The mechanisms made for dental restorations and those for orthodontic treatment are essentially different in purpose. Dental prosthetic appliances are substitutes for lost teeth and contiguous structures and their success is dependent upon the unchanging durability. They are intended and are made to remain passive. Orthodontic appliances, in order to produce results, must be active and regularly adjusted in order to obtain activity which is the essential factor in stimulating growth and structural changes in the jaw tissues necessary for improvement. They are successful only as they are capable of properly inducing teeth to move into normal positions. To accomplish this, orthodontic appliances must be progressively changed. This requires not only repeated reshaping, but also the substitution and addition of parts as treatment progresses and this is much more difficult to accomplish with the bulky, low-grade mechanisms commonly made and designed in the dental laboratory. An orthodontic appliance is, therefore, not a passive, harmless thing in the mouth. It must result either in good or harm so long as it is worn. The dentist, and not the laboratory, is responsible to the patient and the outcome depends wholly on the ability of the practitioner....

Dental casts cannot possibly portray the conditions necessary for proper treatment-planning. This commonly prevailing practice by dental laboratories the nation over, is resulting in immeasurable harm to countless thousands of children. No orthodontist, worthy of the name, would think of assuming the responsibility of treatment without a personal examination of the patient and the weighing of all obtainable factors before proceeding. And it is inconceivable that any dentist, worthy of the name, would allow himself to undertake orthodontic treatment based on laboratory diagnosis and with appliances planned by a dental laboratory from casts only....

The commercial dental laboratories are less to be blamed than those members of the dental profession who patronize them. The laboratories must not be censured for legitimately increasing their earnings. Their success is based upon the amount of money they can make and transfer from their business into their private accounts. They have no responsibility to the patient for the results produced by the mechanism they make. The dentist is fully responsible and his success must be based upon the good he can bring about for his patients. His financial reward ultimately depends upon this.

It has been suggested frequently that the general practitioner might treat the "simple" cases. While it is true that some cases require less skill and experience than others, every orthodontist knows that some cases which at first appear to be simple, turn out otherwise and require the use of all of his resources before they

are satisfactorily finished. It is almost impossible to recognize a "simple" case. We are dealing with problems of growth and development, and many unexpected conditions may arise during the treatment of a case.

CONCLUSION

The evidence brought to light by this investigation proves that it is absurd to expect a laboratory mechanic, who has had no dental school training or education in orthodontics, and who is not conversant with the rapid advances in orthodontics, to be able, from a set of plaster casts, to provide the correct appliance and furnish adequate instructions for the successful treatment of a case of malocclusion.

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636 Church Street.

THE RADIODONTIC ASPECT OF ORAL DIAGNOSIS

By D. W. Lovett, D.D.S., Iowa City, Iowa

Roentgenograms, in recent years, have been used more than any other aids in making an oral diagnosis. Many patients have been led to believe that an x-ray picture offers an infallible verdict as to the condition of the structure pictured. This is largely due to the false impression given by the medical and dental professions in their reports to the patients regarding the diagnosis. But the false impression does not lie with our patients alone, but with many of our fellow practitioners as well, in that some fail to fully evaluate the roentgenogram, and others see only what they intended to find, whether it appears in the roentgenogram or not. This makes the major requisite of radiodontic oral diagnosis an ability to evaluate a good roentgenogram, to understand our findings and to associate them with the other factors in the oral diagnosis.

It is not my purpose to explain the procedure of obtaining a satisfactory oral roentgenogram, but to help in its evaluation once it has been obtained. We shall assume that we are dealing with a good roentgenogram.

To interpret a roentgenogram, we not only must know the roentgenographic densities of the structures with which we are dealing, but also must have a knowledge of the anatomic and histologic structures, the physiologic and pathologic processes and the bacteriologic reactions. Any one or more of these facts may have a definite significance in the roentgenogram. The anatomic form of the bone surrounding and adjacent to the oral cavity is well-established. But, at times, we find that these bony structures vary in form from the normal as in a high cheek bone or zygomatic arch, a low zygomatic arch, a large or small maxillary sinus or antrum of Highmore, a large or small frontal sinus, a light or heavy nasal arch or a malformed hamular process. The size of the canine fossa,

the pterygopalatine and incisive canals, the posterior palatine and anterior palatine foramen and the cartilaginous and bony part of the vomer may vary from the normal. Some of the abnormalities of the mandible are seen in the size of the ramus and the body of the mandible, thickness of the internal and external oblique ridge, shape of the coronoid process and size of the infradental canal, mental foramen, sublingual and submaxillary fossae, mental protuberance and genial tubercles. We should have a knowledge of these anatomic forms, both the normal and all deviations, and be able to visualize the structures as they might appear in the roentgenogram. But before we look at the roentgenogram, we must consider the histologic structure of the tissues that make up these anatomic forms and the roentgenographic density of the structures.

Compact or cortical bone has lamellae distributed in an orderly manner, following a definite architecture, evidently designed to meet the stresses of shock, muscle pull and functional movement. This bone is quite dense and compact and affords much resistance to the passage of the x-rays, thus showing up as a light area on the roentgenogram.

Spongy or cancellous bone is also made up of lamellae, but these are laid down in a haphazard manner, apparently following no prearranged plan. The function of this type of bone is evidently to serve as a network for holding the various cells which form the marrow, and to provide space for blood vessels and lymphatics. These lamellae, or threads of bone, forming the network of cancellous bone are resistant to the passage of the x-rays and also show up as fine light lines on the roentgenogram. But cancellous bone, as a whole, is less resistant to the passage of the x-rays than cortical bone and will show up dark in the roentgenogram, covered with the thin light lines of the threadlike network which makes up the mass of bone. The tissues that occupy the spaces of this network afford little resistance to the passage of the x-rays, and so they show as dark areas on the roentgenogram. The spaces in the network of cancellous bone, such as the large spaces found in the maxillary structures and the small spaces found in the symphysis of the mandible, while variable in size, are of the same structural formation. The roentgenographic difference is due to the size and distribution of the spaces. The fewer and smaller the spaces, the lighter the structure in the roentgenogram.

The age of these structures must also be taken into consideration. By this, I mean both chronologic age and structural or dental age. These two factors are often neglected because of the lack of associating factors. In the oral cavity, we have the tooth, a specialized organ that we may use as a basis for judgment of the structural age. This is useful only in the roentgenograms of patients below the age of 8. Above that age, we have the densimeter or penetrometer technics and they give us only structural roentgenographic density and not structural formation. The structural roentgenographic density is of little value in considering structures of about the same age, but is of some value in the comparison of structures of a few years' difference in age. Above the age of maturity, the histologic formation is of little or no value that can be determined by the roentgenogram. Beyond maturity, we deal with the mineralization and calcification of the tissues for roentgenographic density.

This brings us to the physiologic and pathologic processes. Most of the bony structures with which we deal are of intercartilaginous ossification, having an outer layer of cortical or hard bone and an inner (bulk) of cancellous or spongy bone. The roentgenographic density of these bony tissues is dependent on the inorganic salts that they contain. The physiologic processes may change the

roentgenographic density by changing the percentage of inorganic salts contained in the tissue. The physiologic processes of the body take the inorganic salts from the bones as they are needed for other parts of the body. Another example of the results of these processes is senility. The body deposits more of the inorganic salts in the bony tissues as age increases. This process is very important in dentistry. Another example is seen in pregnancy, when the diet of the expectant mother is not adequate to care for herself and the fetus. The inorganic salts needed are drawn from the mother's bony tissues. This does not often affect the bones with which we are primarily interested, but we often see decalcification of teeth during pregnancy. It is not distinguishable roentgenographically except in the large, progressive carious areas distinguishable in the roentgenogram.

There are a great number of pathologic processes of the oral cavity that afford enough destruction of tissues to be distinguished in the roentgenogram, but all disease must progress far enough to cause tissue destruction to a certain degree before it can be shown in the roentgenogram. In other words, we visualize the destroyed tissue in the roentgenogram and associate this with a pathologic process. As the early stages of a pathologic process cannot be shown in the roentgenogram, when there is a large area of tissue destruction the condition has probably been of long duration. Since the destructive agencies seem to follow the path of least resistance, large areas of destruction are found in the cancellous bone, with slight destruction of the cortical bone. The natural restorative process for bone is shown in the rapid regeneration of the cancellous bone when the surrounding cortical bone has not been destroyed. The re-formation of the cortical bone, which is very slow, occurs when the periosteum has not been denuded. The regeneration of bone is much more rapid if the organic matrix has not been destroyed.

The peridental membrane is the first affected tissue to be distinguished in the roentgenogram. This is not due to the destruction of the tissues necessarily, but to the swelling of the membrane when it is pathologically or bacteriologically affected. Normally, the peridental membrane should appear on the roentgenogram as a thin dark line between the tooth and the bony socket. At the time of eruption of the tooth, it is quite thick, diminishing in thickness with age, the greatest degree up to the time of adult age. After maturity, the membrane does diminish in thickness, but the process is quite slow. At maturity, it should be less than 1 mm. thick, and any thickening of more than that amount should be classed as abnormal. Anatomically, the peridental membrane is slightly thicker at the apex, diminishing gradually in thickness as it passes toward the crest of the alveolus, but, owing to the distortion in nearly all roentgenograms, it appears to be of about the same thickness throughout. This amount of distortion is not great enough to prevent recognition of an abnormal membrane in a good roentgenogram. The dense bony portion of the tooth socket, often spoken of as the cribriform plate or lamina dura, affords attachment for the fibers of the peridental membrane on one side and the cementum of the tooth on the other side. The cribriform plate at maturity is about 1½ times as thick as the peridental membrane. When destruction does occur in this region, the cribriform plate is much more readily destroyed than are the cementum and the dentin of the tooth. The destructive process has been of long duration when we find a portion of the apex of the tooth destroyed. Apical destruction of the tooth has been shown with both great and little bony destruction. The reason for this has not been definitely determined.

The abnormalities and destruction of

the tissues can be determined roentgenographically only by the roentgenographic density. The tissues, fillings, etc. of the oral cavity and surrounding parts can be listed as follows according to density, beginning with the most dense: metallic fillings, etc., enamel, dentin, cortical bone, cementum, cancellated bone, medullary spaces, foramen and soft tissues. A variation in the density of these structures, when a standardized roentgenographic technic is used, should be distinguishable to be of any diagnostic value.

In every roentgenogram of the teeth is at least one roentgenographic landmark. The most important landmarks of the regional anatomy are: upper arch, nasal spine, septum, nose, nasal cavity, incisal foramen, incisal fossa, canine fossa, zygomatic arch, maxillary sinus, posterior palatine foramen, posterior nasal spine, hamular process, lower arch, mental protuberance, mental spines, mental foramen, external oblique ridge, internal oblique ridge, mandibular canal, angle of the mandible and coronoid process. The landmarks should be readily recognized as such and not mistaken for abnormalities. They are of definite diagnostic value.

For the specific consideration of all these factors, we shall use an intra-oral roentgenographic survey of both arches, starting with the roentgenogram of the upper third molar region.

First, view the entire film as a whole, judging the roentgenographic densities of the structures.

Locate the roentgenographic landmarks and determine their normality or abnormality and their association with the other structures shown. The network formation of the cancellous bone, showing the medullary spaces, should be undisturbed in the normal condition. The floor of the maxillary sinus, in the roentgenograms in which it is shown, should be carefully traced and any change in continuity noted.

Starting at the distal portion of the tooth, trace the cribriform plate completely around the root of the tooth and note the abnormality of the tissue, also tracing this cortical plate of bone up to the interproximal space and over the interproximal alveolus. In a normal case, there is no interproximal bony destruction and the cortical plate should be easily traced over the adjacent tooth.

Examine the peridental membrane from one interproximal space around the root to the other interproximal space and note any swelling or destruction shown in this tissue. The cementum or surface of the root of the tooth should appear smooth and regular in outline.

Examine the root canals for foreign bodies and obstructions of the canal walls, and the pulp chamber for foreign bodies, obstruction by the walls and pulp stones.

Observe the continuity of the enamel at its outer surface and also at the dentino-enamel junction. The dentin in its normal state will appear of the same density throughout the tooth.

All these points should be carefully examined and judged for each tooth in the roentgenogram and for each roentgenogram in the survey and correlated in a roentgenographic diagnosis.

To make the radiodontic aspect of an oral diagnosis complete, the roentgenographic diagnosis should be associated and judged with the rest of the oral diagnosis.

DENTAL ORGANIZATIONS IN THE UNITED STATES: A CENTURY OF ACHIEVEMENT*

By HARRY BEAR, D.D.S., F.A.C.D., Richmond, Va.

EARLY in the nineteenth century, there developed a keen interest in dentistry, leading to the foundation of its journalistic literature and the first dental college and the creation of its earlier societies. This period also witnessed the development of improved procedures in the treatment of dental disease and the introduction of newer mechanical devices. There were many notable dentists of this period; men who were well trained in the fundamentals of medicine and who specialized in the practice of dentistry. There were also a number of charlatans and itinerant and poorly prepared dentists, whose procedures and practices lowered the professional standards of the time. A tendency toward secrecy and a lack of cooperative effort then existed among the practitioners. The need and desire for association and the exchange of ideas soon culminated in the formation of dental organizations.

The first dental society of which any records are available is the Society of Surgeon Dentists of the City and State of New York, which was organized in New York, N. Y., December 3, 1834. This society was founded through the efforts of the better educated dentists of that period, many of whom had the degree of doctor of medicine. This was the first regularly organized dental society in the world.[1] While it is not known definitely how long this society remained in existence, it is believed to have functioned until 1840.[2]

AMERICAN SOCIETY OF DENTAL SURGEONS

It is probable that, through the stimulus of some of the leading members of the American Society of Dental Surgeons, a national convention of dentists was held in New York, N. Y., August 18, 1840. At that meeting, there were fifteen dentists present in fact and twenty-three present by proxy, letter and invitation.[3] The society was formally organized as "The American Society of Dental Surgeons." The officers elected were: Horace H. Hayden, M.D., Baltimore, president; Josiah F. Flagg, M.D., Boston, first vice-president; Eleazar Parmly, M.D., New York, second vice-president; James Gardette, Philadelphia, third vice-president; Solyman Brown, A.M., New York, recording secretary; Chapin A. Harris, M.D., Baltimore, corresponding secretary; Elisha Baker, New York, treasurer, and J. H. Foster, M.D., New York, librarian.

The purposes of this society were set forth in Article I of its Constitution:

> The objects of this Society are to promote union and harmony among all respectable and well informed Dental Surgeons; to advance the science by free communication and interchange of sentiments, either written or verbal, between members of the Society, both in this and other countries; in fine, to give character and respectability to the profession, by establishing a line of distinction between the truly meritorius and skillful,

*Third of a series of three papers, on dental education, dental literature and dental organizations, to appear in successive issues of THE JOURNAL in timely accord with the plans for the Centennial celebration, in Baltimore in March, of the establishment of dentistry as a separately organized profession.

and such as riot in the ill gotten fruit of unblushing impudence and empiricism.[4]

It is of interest to note the charitable objects of the society as expressed in Article XIV, Section 1:

Any surplus monies in the treasury, may be appropriated, at any regular meeting of the Society, for the aid and relief of the widows and orphans of deceased members; or for the benefit of living members reduced to want, by sickness or other calamity; it being provided that no such appropriation shall be made without the consent of two-thirds of the members present.[5]

The importance of the founding of this society is reflected in the editorial comments of the *American Journal of Dental Science* of that day:

The extracts from the proceedings of the *American Society of Dental Surgeons,* contained in this number of the Journal, will, we doubt not, be received by our professional readers with pleasure. The formation of this Society forms a new epoch in the history of this department of Surgery; it betokens, on the part of those concerned in the getting of it up, a determination to rescue the Science from the neglected condition in which it has so long remained, and to elevate it to a level with the other branches of medicine. That they will succeed in this, we hesitate not to affirm, provided the Society be properly conducted. Having set out with the determination to admit none to membership in it, except such as are respectable and known to be competent to practice the profession, it only remains to carry out this resolution to ensure for the association the beneficial results which its warmest friends have dared to anticipate. For our own part, we are sanguine in the belief that it will be productive of great good both to the profession and community at large. We rejoice, therefore, at its formation, and most fervently do we hope that the objects contemplated by it will be realized.

A National Society of Dental Surgeons being now organized, and we believe, under auspices that promise the most favourable and happy results, we trust that the educated and better informed members of the profession will come forward and unite their efforts with those who have engaged in this most noble and praiseworthy enterprise; for it is an enterprise which has for its object the advancement of the Science, the dignity and respectability of the avocation, and the good of the community. Let not selfishness, jealousy, or sordid ambition, keep any one, having just claims to a scientific and thorough knowledge of the art, away. Nor let any one imagine that by his own individual efforts, however high, as a practitioner, in public estimation, he may stand, can remove from the profession of which he is a member, the odium that empyricism has fixed upon it. This attaches, more or less, to all, and will continue to do so, until the educated and scientific of their members, shall, as a body put forth their efforts to elevate the standard of professional qualification.—To this end, a Society of this kind seems eminently calculated.[6]

In a subsequent issue of the *American Journal of Dental Science,* the secretary, Solyman Brown, in response to inquiries concerning the qualifications for membership, said:

The original founders of the society were unanimous in the resolution to admit knowingly no individual as a member, with whom they could not cheerfully associate as a gentleman of unimpeached moral character. . . .

Respectable talents:—creditable acquirements:—professional integrity;—and a good moral character. These four requisites are esteemed indispensable to a useful performance of the difficult and delicate duties of the dental surgeon; and all these, therefore, will be deemed essential to a fellowship in this association.[7]

The members of this society were very earnest in their zeal to subdue quackery and to maintain a high ethical standard. Its activities contributed much to the elevation of the profession, but there developed some dissension in the ranks accentuated by the "amalgam war" of that time. Progress of the society declined and it finally disbanded in 1856.

VIRGINIA SOCIETY OF SURGEON DENTISTS

While this paper deals with organiza-

tions that are national in scope, it is of interest to refer to the founding of the Virginia Society of Surgeon Dentists, because of its unique character. This society was founded by a group of eighteen dentists, present in person or by proxy, at a meeting held in Richmond, December 12, 1842.[8] The constitution which was adopted followed in a general way that of the American Society of Surgeon Dentists. As far as is known, this was the first dental society to be incorporated. The following appears in the Acts of the General Assembly of Virginia, Session 1844-1845:

CHAP. 126—An ACT incorporating the Virginia Society of Surgeon Dentists.

(Passed February 3, 1845.)

Whereas Samuel Lethbridge, John G. Wayt, James D. M'Cabe and others, citizens of the state of Virginia, have formed themselves into a society under the title of *"The Virginia Society of Surgeon Dentists,"* whose objects are the promotion of dental science, the establishment of a library and cabinet of anatomical preparations, for the purpose of introducing a sound system of dental education: and it having been represented to the general assembly that the members of said society are desirous of obtaining a charter of incorporation, that they may, with lawful protection carry out their laudable purposes:

1. *Be it therefore enacted,* That the members of the aforesaid society, together with such others as shall hereafter be associated with them, and their successors, are hereby created a body politic and corporate, by the name and style of *"The Virginia Society of Surgeon Dentists,"* and by that name shall have perpetual succession and a common seal, and may hold and dispose of lands and tenements, goods and chattels, not exceeding twenty-five thousand dollars at any one time; and may sue and be sued, plead and be impleaded.

2. The said society may also enact such constitution and by-laws (not repugnant to the laws of this state and of the United States) as they may think proper for carrying into effect the object of the institution; and may do all other acts proper for corporate bodies to do.

3. The legislature reserves the right to modify or repeal this act.

4. This act shall be in force from the passing thereof.

The Virginia Society of Surgeon Dentists also participated in the discussions regarding the uses of amalgam. It declared that the use of amalgam constituted malpractice, but it did not require a pledge of its members to refrain from its use. Other differences developed among the members and, while the society was not dissolved, it ultimately ceased to function. It was superseded by the organization of the Virginia State Dental Association, in 1870.

AMERICAN DENTAL CONVENTION

During the period when there were discussions regarding the dissolution of the American Society of Dental Surgeons, a movement was already on foot to organize another national society, with the intention of avoiding the errors of the first national group. Accordingly, the American Dental Convention was formed by a number of dentists who gathered in Philadelphia, August 2, 3 and 4, 1855. About eighty dentists joined the convention at its first meeting. In contrast to the other group, this new society provided for membership of practitioners of auxiliary branches of science. The society held annual meetings and continued to grow in membership. It was soon found that this organization, like its predecessor, failed to attain all the objectives which had been planned for it. An attempt was made by the convention to encourage research and a study of the biologic sciences, but efforts in this direction failed, because of a lack of appreciation of this need. The last meeting was held in 1875 and the organization passed out of existence in 1876.[9]

AMERICAN DENTAL ASSOCIATION

While the American Dental Convention was holding its fifth annual meeting,

in Niagara Falls, N. Y., another group assembled in that city and organized the American Dental Association, August 31, 1859. The Constitution and By-Laws were formulated and these were adopted at the meeting held in Washington, D. C., July 31, 1860, when regular officers were also elected. The Association met annually except in 1861, when the War between the states interfered.

The Association progressed slowly but surely, and successfully avoided the objectionable features of the two preceding national societies. Since the War between the states geographically separated the members of the profession, those in the south organized the Southern Dental Association, in Atlanta, Ga., July 28, 1869. While this organization was a sectional group, as its name implies, it became more nearly national in scope through its services to the former Confederate States during the "period of reconstruction." The Southern Dental Association met regularly and continued its effective service for twenty-eight years. In the course of time, the leaders of both organizations realized that their efforts and desires were identical. At a meeting held in Old Point Comfort, Va., August 5, 1897, arrangements were perfected whereby the two associations were consolidated under the name of the National Dental Association. Among the prominent leaders in this amalgamation were Thomas Fillebrown, Boston, of the American Dental Association, and B. Holly Smith, Baltimore, of the Southern Dental Association. Dr. Fillebrown was made president of the newly formed National Dental Association and Dr. Smith, secretary. It was at the meeting of this Association at Omaha, Nebr., in 1898, that Dr. Fillebrown, in his presidential address on the value of organization, said, in part:

> Organization is essential to the success of any movement in which the combined effort of several individuals is desired.
>
> It converts the irresponsible mob into the disciplined and responsible army. It is the fly-wheel of progress which gives balance to combined efforts, brings up and pushes forward the laggard of conservatism, restrains the erratic flight of the too exuberant enthusiasm of the reformer, gives steadiness to action, and makes advancement sure. . . .
>
> An association of persons for the promotion of scientific investigation is but a small municipality, and demands the same organization for its successful advancement. . . .
>
> The value of the professional organization today is not simply bringing together the great, the good, and the wise to exchange congratulations on what the few know more than the many, but in order that the many may meet the few and that knowledge, culture and refinement and a true professional spirit may be more widely diffused and better appreciated.[10]

In 1913, the National Dental Association was reorganized on a plan whereby the several state societies became component units of the parent organization. This plan also provided for the creation of a house of delegates of the National Dental Association. By this provision, the legislative authority in the national group was vested in the delegates from the various component state societies. In 1921, the name was again changed to the American Dental Association.

The American Dental Association has grown by leaps and bounds and has exerted a powerful and beneficial influence in strengthening the state societies. With a membership of approximately 46,000, it is the official representative of organized dentistry in this country. Its sphere of usefulness has been extended from year to year. The various activities of the Association are so well known that it would be superfluous to discuss them. A listing of some of these will suffice: publication of a monthly journal; work of the Bureau of Public Relations, Library Bureau, Council on Dental Therapeutics, Committee on Dental Legislation, Council on Dental Education, Committee on Dental Indexing, Research Commission, Committee on Dental Economics and Relief Fund Commission; the Na-

tional Health Program, and the Group Insurance plan. There are many other important committees and bureaus which function effectively in maintaining and enhancing the services of the Association to the state societies and to its constituent members. The annual budget of more than $300,000 is expressive of the size and importance of the organization.

ASSOCIATIONS OF SPECIAL GROUPS

There has been a gradual increase in the profundity of the profession in accord with the development of the knowledge of the various sciences auxiliary to dentistry. This has given rise to more exacting demands of various branches of practice. The first association of specialists was the American Society of Orthodontists, organized in 1900. Many other groups of specialists have since been founded, as well as a number of special groups. These are listed in Table 1.

TABLE 1.—SPECIAL GROUPS*

Name	Year Organized	Number of Members
Dental Protective Association of the United States	1888	
American Society of Orthodontists	1900	600
American Academy of Periodontology	1914	162
National Society of Denture Prosthetists	1918	46†
American Society of Oral Surgeons and Exodontists	1918	206
Association of American Women Dentists	1921	175
American Society for the Promotion of Dentistry for Children	1925	625
American Full Denture Society	1928	82
American Academy of Restorative Dentistry	1928	114
American Society for the Advancement of General Anesthesia in Dentistry	1929	126
American Association for the Advancement of Oral Diagnosis	1932‡	
National Association of Dental Anesthetists	1937	60
American Association of Public Health Dentists	1937	65
American Public Health Association: Oral Health Group	1937	45
American Dental Foundation	1938	
Association of Military Surgeons: Dental Section§	1939	645

*Data obtained in most instances from the secretaries of the various groups.
†Limited to fifty members.
‡Disbanded in 1937 and resumed activities in 1939.
§Separate organization of military dental surgeons was organized in 1913; amalgamation was effected in 1939.

NATIONAL DENTAL ASSOCIATION

In an effort to correlate the activities of the Negro members of the profession in Virginia, Maryland and the District of Columbia, the Tri-State Dental Association was organized, in 1913. Its membership grew until fourteen states were included. The name was changed in 1918 to the Interstate Dental Association. With continued progress in 1932, the National Dental Association was incorporated. Its Constitution states: "To achieve this end, the National Dental Association shall endeavor to unite and coordinate the Negro members of the dental profession of America into one compact body, thus creating a power, the units of which will work in the interest of the local and state dental societies and other allied organizations." There are now more than 700 members in this Association.

INTERNATIONAL ASSOCIATION FOR DENTAL RESEARCH

The International Association for Dental Research was founded in New York, N. Y., December 10, 1920, mainly through the efforts and with the encouragement

of William J. Gies. The purposes of this organization are best explained by quoting from its constitution:

The Association has been established (a) to promote broadly the advancement of active research in all branches of dental science and in related phases of the sciences that contribute directly to the development of dentistry, and which add to the knowledge of the mouth and teeth and of their relations to the body as a whole; and further, (b) to encourage and facilitate cooperative effort and achievement by, and mutual helpfulness among, investigators in all nations in every division of stomatology; (c) to the end, particularly, that dentistry may render cumulatively more perfect service to humanity....

Sections have been organized in many parts of the world. The American division has twenty-one sections; Canada, three; China, one; England, one; Germany, two; Hungary, one, and South Africa, one. The association, which has 493 members, meets annually, usually at the same place and for the two days preceding the meeting of the American Association of Dental Schools. The Association owns and publishes bimonthly the *Journal of Dental Research*. This journal, which is the only one of its kind, has been published regularly since 1919.

PAN AMERICAN ODONTOLOGICAL ASSOCIATION

During the meeting of the American Dental Association in Atlantic City in 1937, a group of dentists assembled and organized the Pan American Odontological Association. This association, which now has ninety members, was projected with the idea of fostering a close professional and cultural exchange between the members of the dental profession in the United States and those of the other countries of the Americas. It seeks to establish an exchange of fellowships between schools of this country and the other nations of Central and South America.

AMERICAN ASSOCIATION OF DENTAL SCHOOLS

For about forty years after the founding of the Baltimore College of Dental Surgery, the number of dental schools increased slowly. From 1880, schools were founded in rapid succession. This developed a situation wherein standards for admission and graduation were lowered instead of being gradually advanced. To curb this unfavorable trend, the National Association of Dental Faculties was organized, in 1884, to "bring about the adoption of a uniform standard of graduation." This organization concerned itself primarily with administration. The American Institute of Dental Teachers was founded in 1893 to promote and coordinate efforts toward better teaching and methods of instruction. A number of the dental schools affiliated with universities became dissatisfied with the policies of the National Association of Dental Faculties and withdrew, subsequently forming the Dental Faculties Association of American Universities, in 1908. These three organizations and the Canadian Dental Faculties Association (founded in 1920) continued their separate existence until 1923, each earnestly attempting to influence and direct the progress of dental education.

Under the guiding genius of William J. Gies, the American Association of Dental Schools was formed in 1923 by the amalgamation of the four above-named organizations. The constitution and by-laws set forth the objectives of this association as follows:

The American Association of Dental Schools has been established to facilitate intercourse and conference among *teachers* of the dental science and arts in North America; to promote advancement of *teaching* and research in American Schools of Dentistry; to encourage thorough study and discussion of the needs and problems of dental education; to improve public understanding and appreciation of the quality and value of dentistry; and to maintain dental education in full accord with the highest require-

ments of professional education in the public service.

This association has endeavored to meet all of these provisions to the fullest extent. The character of its annual meetings has been consistent with the general trends in education and with the changing social order. Beginning with the year 1936, the association has published *The Journal of Dental Education* four times yearly.

Supported by a grant from the Carnegie Corporation of New York, the Curriculum Survey Committee of the American Association of Dental Schools recently made a study of the curricula of the member schools. This report, "A Course of Study in Dentistry," was published in 1935. The final report and the discussions at annual meetings preceding its publication have served a very useful purpose in assisting the faculties in revising the courses of study in dental schools. The association is now engaged in a study of teaching methods, and it is expected that this report will be completed in 1940.

The membership of the American Association of Dental Schools consists of thirty-eight schools in the United States and five in Canada, the Rochester Dental Dispensary and School for Dental Hygienists, the Forsyth Training School for Hygienists and the Murry and Leonie Guggenheim School for Dental Hygienists.

COUNCIL ON DENTAL EDUCATION

Concurrently with the development of the schools, the various states enacted laws regulating the practice of dentistry. There was considerable variation in these requirements and there were also many differences among the schools. In an effort to obviate these misunderstandings and also to raise the scholastic standards, the Dental Educational Council of America was organized, in 1909, at Old Point Comfort, Va.

The council as at first constituted consisted of five members each from the National Association of Dental Faculties, National Association of Dental Examiners and National Dental Association. In 1922, three members from the Dental Faculties Association of American Universities were added, making the membership of the Council eighteen. This was later changed to twenty-four members, eight from each group. After the organization of the American Association of Dental Schools, in 1923, the membership of the council consisted of six members from that association and six each from the National Association of Dental Examiners and American Dental Association. In 1932, this was changed to three members each from the three groups represented.

The council has had a salutary effect on dental education and, by virtue of its periodic inspection of schools, has sought to improve the curriculum, elevate standards and create a friendlier spirit of cooperation among the schools. Its system of accreditation was largely responsible for eliminating the proprietary school and advancing the standards of the other schools.

In 1937, by action of the House of Delegates of the American Dental Association, the name was changed to the Council on Dental Education, which is a standing committee of the A.D.A. The personnel consists of nine members, three each from the associations named above. This newly created council recently resolved "that the criteria for evaluating the course of study in dental schools be completed and published not later than January 1941, and that inspection of schools for the purpose of accreditation begin not later than the academic year 1942."

HONOR SOCIETIES

The American College of Dentists was organized August 20, 1920. It was established to give recognition to leaders in the profession and to "lend its influence to every movement having for its purpose the advancement of professional

ideals and the betterment of dental service to humanity."[11] The constitution states that the college "was established to promote the ideals of the dental profession; to advance the standards and efficiency of dentistry; to stimulate graduate study and effort by dentists; to confer fellowship in recognition of meritorious achievement, especially in dental science, art, education and literature; and to improve public understanding and appreciation of oral health-service," and that "suitable means shall be used to attain these and related objectives." Fellowship in the college, which confers upon the recipient the F.A.C.D. degree, is by invitation only. Numerous sections of the college have been established in many parts of the United States. The total membership is now 946.

The college has helped to support the *Journal of Dental Research* both financially and morally. It has also assisted in many other worthy projects and it made a notable contribution to dentistry when it published the report of the Commission on Journalism. Its *Journal of the American College of Dentists,* published quarterly, is a worthy publication, now in its seventh year.

The International College of Dentists had its beginning in 1920 and was incorporated in 1928. It consists of a foreign membership of 300 and a United States Section with 350 members. The U.S.A. Section is limited to 500. The fellowship degree, F.I.C.D., is conferred during the annual meetings of the college. Excerpts from its constitution explain the purposes of this organization:

> Its object is: (1) To recognize conspicuous and meritorious service to the profession of dentistry, (2) To cultivate and foster cordial relations among those engaged in the practice of the arts and sciences of dentistry, and of medicine and collateral branches, (3) To cooperate with dentists and various organizations in the interest of progress in the arts and sciences of dentistry, (4) To endeavor to unite outstanding members of the dental profession of the United States for the purpose of fostering the growth and the diffusion of dental knowledge, (5) To establish and maintain a high standard of competency and character for practitioners of dentistry, (6) To uphold, assist and maintain a high standard in dental education and in regulating the practice of dentistry, etc. etc.

In order to promote and recognize scholarship among undergraduate dental students, the Omicron Kappa Upsilon Honor Society was founded, in 1914. Membership is awarded to the outstanding members of graduating classes each year. This has served its purpose well and is a much coveted honor among students and graduates. The business of this organization is conducted by a supreme chapter, which meets annually, usually at the time and place of meeting of the American Association of Dental Schools. There are at present active chapters in thirty-three dental schools.

TABLE 2.—FRATERNITIES

Year Organized	Name	Active Chapters	Alumni Chapters
1882	Delta Sigma Delta	33	39
1889	Xi Psi Phi	24	19
1892	Psi Omega	32	61
1901	Sigma Epsilon Delta	5	4
1907	Alpha Omega	32	18
1918	Upsilon Alpha Sorority	6	
1922	Dental Interfraternity Council		

FRATERNITIES

In common with other college groups,

various Greek letter dental fraternities were established in the several colleges beginning about fifty-seven years ago. These are listed in Table 2.

AMERICAN ASSOCIATION OF DENTAL EDITORS

Since the publication of the first dental periodical, the *American Journal of Dental Science,* in 1839, the dental literature has increased tremendously. There are numerous national journals and state and local bulletins. In order to correlate some of these activities which are of common concern, the American Association of Dental Editors was organized, January 18, 1932, with a membership of forty-nine, representing forty-nine periodicals. The membership of this Association is now 245, representing ninety-five periodicals. It has concerned itself in many important considerations in an effort to improve the standards and promote uniformity in dental literature.

BOARDS OF EXAMINERS

As the profession developed, and the requirements for the study of dentistry increased, and because of the various differences in many parts of the country, laws were enacted providing for the regulation of admission to practice and the establishment of state boards of examiners. These provisions are now enforced by all the states. Uniting the efforts of these individual boards is the National Association of Dental Examiners, which was organized in 1883. Forty-three states now hold membership in this Association.

For many years, a number of dentists have been interested in the matter of reciprocity in state board examinations. This caused considerable discussion and arguments were advanced pro and con. As a result of continued agitation, the National Board of Dental Examiners was created, by the enactment of an amendment to the Administrative By-Laws of the American Dental Association, at its meeting in 1928. The personnel of the board now consists of five members each from the American Dental Association and the American Association of Dental Schools. The Surgeons General of the Army, Navy and Public Health Service are ex-officio members.

After several years of experimentation, the board now functions by issuing a certificate of qualification to those who successfully pass the examinations. These examinations do not include a test of clinical proficiency. The board has no legal status and it is optional with the various states or their examining boards whether these certificates are recognized. At the present time, several states accept this certificate of qualification in lieu of the written examinations.

With the advent of specialization in dentistry, there has arisen a desire on the part of interested persons for the establishment of boards for the certification of specialists. The first of these to be organized was the American Board of Orthodontia, which was founded in 1929. To date, 178 certificates of qualification have been issued by this board.

The American Board of Periodontology was created in 1939, by the American Academy of Periodontology. This board has not as yet become operative, but plans are being formulated to begin functioning at an early date.

In order to further stimulate and coordinate interest in this subject, an advisory board for dental specialties was created in 1939, during the meeting of the American Dental Association. Delegates from eleven national associations attended the conference. The object of this advisory board is to correlate the activities of the various groups in standardizing methods of education and certification of specialists.

FÉDÉRATION DENTAIRE INTERNATIONALE

The Fédération Dentaire Internationale is a permanent organization, created by the Third International Dental Congress at its meeting in Paris in 1900. Meetings of the F.D.I. are held annually.

The congress convenes every fifth year (approximately), its membership consisting of delegates from the various national dental societies of the world. Its purposes are to promote the interests of dental science throughout the world and to maintain and strengthen the union among dental practitioners of all nations. Three meetings of the International Dental Congress have been held in the United States: in Chicago, in 1893; St. Louis, 1904, and Philadelphia, 1926.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

The American Association for the Advancement of Science, a highly important scientific body, has been in existence for ninety-one years and now has a membership of more than 20,000. It was not until 1931, however, that the dental profession was admitted to associate relationship with the A.A.A.S., with the American College of Dentists as a member. Since that time, the American Association of Dental Schools and the American Dental Association have also become associates. The International Association for Dental Research (American Division) was admitted to affiliate relationship in 1935. Here again, the profession is indebted to William J. Gies for his efforts in consummating this relationship. The A.A.A.S. has created in Section N (Medical Sciences) the Subsection on Dentistry. There have been regular sectional programs annually, beginning with the session at Atlantic City in 1932.

AUXILIARY ASSOCIATIONS

In addition to the organizations previously described as strictly dental, there are several affiliate groups. The American Dental Hygienists' Association, founded in 1923, now has a membership of 1,500. The American Dental Assistants Association, with a membership of 3,000, was also organized in 1923. For some time, there existed an American dental laboratories association, which was formed in 1920. This has since been superseded by the Dental Laboratories Institute of America, which was organized in 1939. The most recent group to be formed is the National Association of Dental Students, which was established at a meeting held in Philadelphia, December 28 and 29, 1939.

In thus recording the activities of dental organizations for the past hundred years, we find that there are listed here thirty-six associations of national scope which exist today. During the century, many other societies were formed, which, for one reason or another, have passed out of existence. In spite of our complex civilization of today, we find that there is a necessity for the dental society, local, state and national; and also a need for many of the specialized groups. Organization of professional groups has a definite place in our social structure, and the members of the dental profession owe it to themselves and to the public to be an integral part of these associations. Since education is a continuing process, the dental practitioner will find that association with his confrères is essential and an asset.

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THE JOURNAL *of the*
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ON TO BALTIMORE!

THE Maryland Dental Association, the Baltimore Dental Society, the American Dental Association and the American College of Dentists invite you to come to Baltimore on March 17 to 20 and participate in the celebration of the most momentous event that has yet occurred in dentistry—the One-Hundredth Anniversary of the founding of dentistry as a profession and as an important branch of the great healing art.

The Local Arrangements Committee, under the very competent and energetic chairmanship of Dr. Lucien Brun, announces that all arrangements for the event are complete and that the profession of Baltimore is ready and waiting for the opportunity to fittingly celebrate this notable event. March 18-20 should be epoch-making dates in recording and celebrating the great advancement that has been made by dentistry since it set out upon its development as an autonomous profession, for every phase of its development and advancement will be effectively exhibited at the coming celebration.

While one hundred years does not seem to be a very long period of existence of a profession, when we measure and evaluate the progressive

steps of dentistry during these years, our accomplishments compare most favorably with those of professions many years older.

When we consider the fact that previous to 1840, there was scarcely any semblance of the soon to be established dental entity of the healing art, and recount the rapid progress made to establish the identity of dental art and science as a distinct and important ancillary to the great art and science of healing, the period of our existence appears much more than a mere one-hundred years in the march of civilization. Such realization should cause the breast of every member of the profession to swell with pride at being a member of the dental profession and being privileged not only to take part in the Centenary Celebration, but to be a participant in promoting the advancement which we are celebrating.

With but the stimulation of hope of an ambitious dream, Horace H. Hayden, in 1840, set forth upon a professional adventure that has been the marvel of the health professions in the rapidity and fulness of its development. Hayden, as the seer and dreamer with a vision of professional accomplishment, aided and accompanied by Chapin A. Harris, the intensely practical doer, launched forth on a career of profession-making that today has been rewarded by a fully matured and permanently established branch of the healing arts.

The enthusiasm and interest aroused by the various committees and sponsors of the celebration, we believe, will result in an event in dental history that should be participated in by every loyal dentist.

The local organization is looking forward to an attendance well over five thousand and anticipates no difficulty in supplying ample and comfortable accommodations for that number and more.

One has but to glance over the preliminary program published in the February issue of THE JOURNAL to realize what a professional literary treat is in store for those who attend.

On Sunday, previous to the celebration proper, the American College of Dentists will present a sort of entrée to the celebration exercises with a program that will serve not only to introduce some of the features of the Centenary, but will, we believe, do much to enhance the anticipatory enjoyment of the program proper.

The College has invited practically all the other organizations participating in the celebration to join with them in the preparatory exercises, as it were, which will include a pilgrimage to the tombs of Hayden and Harris, to be followed by a grand banquet on Sunday evening.

The coming Centenary has been designated as a tripodic dental cele-

bration and will truly be such. The three foundational professional stones upon which dentistry has been erected—the School, the Society and the Journal—will receive the lion's share of attention, but all of the incidental and supplemental phases of professional development will also receive appropriate attention.

The Local Committee has labored zealously and unceasingly in preparing for this unusual occasion, and every member of the American Dental Association should express his appreciation of the efforts of the Committee by attending the Dental Centenary.

Finally, the Officers of the Centenary Celebration, the Local Committee of Arrangements, the American College of Dentists, the American Dental Association and the dental profession of Baltimore extend a hearty and cordial welcome to the guests of the Dental Centenary in Baltimore March 18-20.

ON TO BALTIMORE!

THE CHICAGO MIDWINTER MEETING

AGAIN the Chicago Dental Society has sustained its reputation for holding each year one of the most interesting and lively dental meetings in the country. Extending over a period of four days, the attendance reached well over eleven thousand, a new mark for the yearly meetings.

The Chicago Midwinter Meeting has long since become national in scope and importance, and the meeting this year was no exception. There were a number of meetings of various dental organizations previous to the meeting proper and all were well attended.

This year the Society, in an effort to broaden the scope of its activities and, too, to enlarge the interest in its educational efforts, continued the plan of presenting a number of limited attendance clinics in conjunction with the sectional meetings. Some forty-odd such clinics were provided, and even though an attendance fee was charged, all the clinics were much oversubscribed. Thus a feature of the meeting which was last year undertaken as an experiment proved eminently successful. The Chicago Society has always emphasized the educational feature of dental meetings, and its reputation for offering educational opportunities to its members and guests has been notable and has contributed much toward the outstanding success of these annual meetings.

The Sections covered every phase of dental science, and this year even the attendance at the Periodontia Section and the Research Section was

close to that of the Oral Surgery and Prosthesis Sections. The attendance at all the Section sessions was unusual, and in some instances overtaxed the ordinarily ample facilities. These interesting meetings, in addition to the limited attendance clinics, furnished attraction sufficient for all the large number present.

The Scientific Exhibit was splendid and well attended as usual. The general clinics on Monday and on Thursday filled to overflowing the large ballroom, and covered all phases of practical dentistry.

The general sessions furnished a refreshing variety to the meeting in that they were devoted almost entirely to entertainment.

The Commercial Exhibits were even more numerous this year than previously and the success of these exhibits we trust reflected the reviving prosperous condition of the country. The Chicago Society this year, in approving collaboration with the policies of the American Dental Association, excluded from its Commercial Exhibit all concerns whose products were not acceptable to the Council on Dental Therapeutics of the American Dental Association, and even with this restriction, the number of exhibitors was larger than in any previous year. The excellent facilities for and the large number of these exhibits make the exhibit one of the most attractive features of the Chicago meeting. Practically all that is new in technics and materials is shown here, and appreciation of this feature of dental meetings is indicated by the large and enthusiastic attendance year after year.

The Chicago Midwinter Meeting has come to be a national dental institution; its sessions, being held in the midwinter season, and at a time when it appears that the dental profession at large desires another meeting, do much toward maintaining through the winter season an enthusiastic interest in matters dental.

We salute the officers of the Chicago Dental Society—Dr. Harold W. Welch, President; Dr. William I. McNeil, President-Elect; Dr. Noel M. Maxson, Vice-President; Dr. Leo W. Kremer, Secretary; Dr. Glenn E. Cartwright, Treasurer and all the active committees, and congratulate them on another conspicuously successful midwinter meeting.

THE DISCOVERY OF ANESTHESIA

It has come to our attention that it is the intention of the Post Office Department in the near future to issue a postage stamp commemorative

of the discovery of anesthesia by means of ether by Dr. Crawford Long, of Georgia, in the year 1842.

While it is not our intention, nor is it the intention of any member of the dental profession to detract in any measure from the honor which is due to Dr. Long, the dental profession has long ago established the fact that the discovery of the phenomenon of anesthesia should be credited to Dr. Horace Wells, a dentist of Hartford, Connecticut.

Dr. Wells, according to definitely authentic records, in 1844, discovered the fact that insensibility to pain could be produced by the use of nitrous oxide gas, so-called laughing gas, and that during this stage of insensibility, a person would not be conscious of pain caused by a surgical operation—in this specific instance, the extraction of a tooth. Dr. Wells subjected himself to the administration of laughing gas, and a confrère, Dr. John Riggs, a dentist of Hartford, Connecticut, extracted a tooth for Dr. Wells without any pain being experienced by him.

The discovery was announced to the world, and the condition of insensibility to pain thus produced was named anesthesia by Dr. Oliver Wendell Holmes. Dr. Wells continued to administer nitrous oxide gas to produce insensibility to pain during extraction operations which he performed continuously for some years.

In 1846, Dr. William T. G. Morton, a dentist of Boston, discovered the fact that anesthesia could be produced by inhalation of sulphuric ether, and that surgical operations could be performed painlessly while the patient was under the influence of ether. This was proclaimed to the world, and Dr. Morton received credit for the discovery of ether anesthesia, and his bust is now in the Hall of Fame of the University of New York in commemoration of that discovery.

It later developed that Dr. Crawford Long, of Georgia, used sulphuric ether to produce anesthesia for the relief of pain during surgical operations as early as 1842. Unfortunately, however, Dr. Long did not announce his discovery until after the announcement by Dr. Morton, and two years after the announcement that anesthesia could be produced by nitrous oxide gas by Horace Wells.

The dental profession maintains that the credit for the discovery of the phenomenon of anesthesia, morally and legally, belongs to Horace Wells, by virtue of the fact that he announced his discovery to the world some two years before any such claim was made by Long.

The Legislature of the State of Connecticut, after a thorough investigation of the facts surrounding the discovery of anesthesia, memorialized

Dr. Horace Wells in its records, and sponsored the erection of a monument on the State House grounds dedicated to Dr. Horace Wells as the discoverer of anesthesia.

This being the one-hundredth anniversary of the establishment of dentistry as a profession—an event which is being celebrated in Baltimore March 18 to 20, of this year—we feel that it would be particularly fitting to memorialize the name of Horace Wells, as the one entitled to the credit of discovering probably the greatest boon to humanity—a means of relief from pain.

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Surgery of Injury and Plastic Repair

By Samuel Fomon, M.D., Ph.D., formerly Major Medical Corps, U. S. Army. Cloth. 1409 pages with 925 illustrations. The Williams and Wilkins Company, Baltimore, 1939.

This new work represents an attempt to evaluate the methods and advances in plastic surgery and the allied fields. To this end, the author has reviewed a tremendous amount of literature on the subject. He includes in this monograph those procedures considered useful or fundamental. The text opens with chapters dealing with the mechanics of surgical operations; suture materials; operating room technic; the care of wounds and burns; fluid, salt and acid base balance; shock; anesthesia, and preoperative and postoperative management of the patient. This material occupies about 500 pages of the volume. This is followed by a series of chapters on regional surgery, beginning with that of the cranium. Here, one finds described certain procedures that have no place in a volume on plastic surgery, as, for example, the treatment of hydrocephalus, which occupies six pages. The chapter following deals with plastic surgery of the nose, and the subject is completely covered and well illustrated. Sections on the eyelids and the auricles follow. Next is a section of 350 pages on the maxillofacial region, the lips, cleft lip and cleft palate, the mandible and the salivary glands. The volume closes with a chapter on surgical affections of the skin.

There is much of value in the volume. One expects to see a certain repetition of textbook plastic procedures in a volume of this kind, but here they are reduced to a minimum. As stated in the preface, the entire field of plastic surgery is not covered; as a matter of fact, the head is the only region discussed. Discussions of the Veau operations for cleft lip and cleft palate are complete and are particularly well done. These procedures deserve wider recognition in this country. It is questionable whether so much attention should be devoted to operating room technic, evaluation of the patient, etc., as these procedures are no different for this type of surgery than for any surgical procedure. However, as a compendium of methods useful in plastic surgery of the head, this book can be recommended to those interested in this field.

The 1939 Year Book of Dentistry

Edited by Charles G. Darlington, M.D., George W. Wilson, D.D.S., Howard C. Miller, D.D.S., Walter H. Wright, D.D.S., Ph.D., and George R. Moore, D.D.S., M.S. Cloth. 799 pages with 534 figures. Price $3. Chicago: The Year Book Publishers, Inc., 1939.

This new volume of the Year Book of Dentistry continues on the high plane and interesting note set by its predecessors. In it, one finds a most complete compendium of work culled from the recent literature of both American and foreign origin. The book be-

gins with a section of 176 pages on pathology and diseases of the mouth, followed by a section on operative dentistry, 142 pages. One hundred and seventy-three pages are devoted to oral surgery; prosthetic dentistry is covered in 152 pages, and the final section of 119 pages is devoted to orthodontia. Throughout the book, an effort is made toward accuracy and conciseness in abstracting these articles of merit. Many of the abstracts are followed by a short editorial comment, which serves to clarify certain controversial points. The book is printed on good paper with clear type of satisfactory size and is profusely illustrated. The volume is of a size convenient for easy reading and reference. These comparatively inexpensive books continue to be a yearly "must have" for the progressive practitioner, deserving enthusiastic support.

Vitamin D: Chemistry, Physiology, Pharmacology, Pathology, Experimental and Clinical Investigations

By C. I. Reed, Ph.D., Associate Professor of Physiology, H. C. Struck, Ph.D., Associate in Physiology, and I. E. Steck, M.D., Instructor in Physiology and Medicine, College of Medicine, University of Illinois. Cloth. 389 pages. Price $4.50. University of Chicago Press, 1939.

The growing trend in medicine and the allied sciences is to present monographs dealing with specific important problems which summarize and coordinate the outstanding work in the field. That this method of approach is obviously necessary is due to the tremendous volume of literature yearly brought out in each field, condensation and evaluation of which presents a tremendous task in itself. In general, few people not actually engaged in active work or study of these problems are capable of performing such a task. The present monograph happily combines such a group. This volume reviews, summarizes and coordinates a large portion of the literature dealing with vitamin D and, in addition, reports the authors' own investigations and conclusions. The book begins with a discussion of the chemistry of vitamin D and the related sterols, the assay methods and available chemical tests. This is followed by an excellent discussion of rickets and the influence of vitamin D, the physiology of vitamin D, the relation of vitamin D to the parathyroid glands, the toxic effects of vitamin D, the effects of vitamin D on mineral metabolism and on blood constituents, the use of vitamin D in the treatment of arthritis and its other therapeutic applications. Each chapter is concluded with a summary which gives the salient points of the preceding discussion. The entire volume is so carefully and lucidly written and presents such an interesting account of the present status of vitamin D that it should prove a great help to those engaged in laboratory or clinical work of this nature.

Diseases of the Mouth

By Sterling V. Mead, D.D.S., B.S., M.S. Cloth. 1059 pages with 633 illustrations and 63 color plates. Price $12.50. Fifth edition. St. Louis: C. V. Mosby Co., 1940.

This well-known volume has again been revised and modified. As in previous editions, it contains a profusely illustrated account of diseases involving the hard and soft tissues of the mouth. There is much to commend this book. Certainly, there was great need for a monograph on this subject which would deal with these diseases in some detail. However, there are so many actual quotations from the literature in this volume that certain sections tend to verbosity rather than complete accounts of the disease under discussion. A much more suitable approach, in the reviewer's opinion, would be a summary by the author of certain reports from the literature, with his own conclusions. The book is printed on good paper, with clear type. It is somewhat too large a book for satisfactory use as a text by students, but should prove helpful to the advanced student and practitioner as a reference work.

Radio Manual: A Compilation of Radio Broadcasts for Mouth Health Education

Published by the Oral Hygiene Committee of Greater New York, New York City. 202 pages. Cloth. 1939.

This volume is a compilation of radio addresses prepared and given by members of the Oral Hygiene Committee of New York to promote interest and to distribute information among the laity regarding mouth

health. To this end, forty-four typical radio addresses have been selected and incorporated in this volume. The material is divided into thirteen portions as follows: children's dentistry, dental infection, dialog, diet, history, medicodental relation, mouth hygiene, orthodontia, periodontia, preventive dentistry, prosthetics, public health and the x-rays. The book closes with a small section on suggestions for radio speakers, containing pithy remarks pertinent to the best methods of broadcasting information. This volume contains many readable, interesting accounts of the value of dental examination and treatment, written in a manner which is readily appreciated by the lay person. In addition, the book should serve as a useful guide to those who are called on to present similar discussions to lay groups, parent-teacher associations or other radio broadcasts. The range of material covered is so wide that almost all topics of popular interest are covered. It can be heartily recommended to those preparing for similar talks and discussions.

Dental Roentgenology

By LeRoy M. Ennis, D.D.S., Assistant Professor of Roentgenology in the Thos. W. Evans Museum and Dental Institute, School of Dentistry, University of Pennsylvania; Instructor in Dental Roentgenology in the Graduate School of Medicine, University of Pennsylvania. Third edition. Cloth. 398 pages. 789 engravings. Price $6.50. Philadelphia: Lea and Febiger, 1939.

In this excellent third edition, Dr. Ennis continues on the high plane of technical composition that marked the previous issues. This complete guide to the x-ray technic of picturing the dental structures is supplied with beautiful reproductions of dental x-ray films exhibiting both the normal structures and the abnormal deviations. The book opens with a short historical summary of the x-rays and is followed by several chapters on the physics of the x-ray machine. Positioning of the film and the patient are thoroughly discussed for both intra-oral and extra-oral roentgenography. A new chapter on the roentgenographic examinations of children is a valuable contribution to the book. There is a most complete section on the roentgenography of the maxilla and the normal variations of the maxillary sinus, adequately illustrated with the author's roentgenograms. An interesting and important feature of this work is the chapter on the association between dental disease and x-ray changes. In this section, the x-ray findings are correlated with the probable pathologic picture to illustrate how the x-rays may function as a valuable diagnostic aid. The book closes with a brief chapter on the use of lipiodol, a halogenated poppy seed oil which is radiopaque, in the localization of fistulous tracts and in root-canal work.

This volume is so carefully and clearly written and so beautifully illustrated that it is unhesitatingly recommended to students and practitioners both as a textbook and as a reference work.

Tooth Form. Drawing and Carving: A Manual

By Russell C. Wheeler, D.D.S., F.A.C.D., Associate Professor of Dental Anatomy, Human and Comparative, St. Louis University School of Dentistry. Paper. 71 pages, illustrated. Philadelphia: W. B. Saunders Co., 1939.

This small paper bound manual is designed to furnish an outline for use in the laboratory portion of a course in dental anatomy. Concurrently with a short discussion of the subject, various technical exercises are discussed for use by the student. Thus, a method of drawing the various teeth on graph paper is presented, followed by a discussion of carving teeth in plaster to scale, using natural teeth as models. As a concise outline of a laboratory course, the manual should prove helpful.

COUNCIL ON DENTAL THERAPEUTICS

PULPROTEX—NOT ACCEPTABLE FOR A.D.R.

Report of the Council on Dental Therapeutics of the American Dental Association, authorized for publication.

THE Council has received sufficient requests for information on Pulprotex (The L. D. Caulk Co., Milford, Del.) to warrant this report.

The Council has invited the L. D. Caulk Company to supply data on the composition of Pulprotex in order that the dental profession to whom the product is promoted might have this necessary information. The firm replied in part as follows:

> Pulprotex Powder is composed of three ingredients: Zinc Oxide, a saturated Hydro-Carbon (which brings about stability of the product), and an accelerator for controlling accurately the time of setting.
>
> Pulprotex Liquid is composed of four components: A refined vegetable oil, eugenol, a bactericide of the saturated thymol group, and an anaesthetic of the alkyl-alcohol type.

Apparently, the composition of this product is semisecret. No evidence was submitted to substantiate the advertising claims made for the product.

An advertising circular inserted in one of the trade packages examined bears the caption "What is Pulprotex?" A careful perusal of the material under the caption failed to reveal the answer to the question unless the advertising claims appearing under the caption might be considered the answer to the firm's own query. In the same circular, the firm poses these questions: "Is Pulprotex truly bactericidal? Can it be depended upon to kill organisms over a wide area?" Apparently, the firm has answered these questions to their own satisfaction by stating: "Its efficiency has been established against the staphylococcus aureus organisms in accordance with the standard U. S. Department of Agriculture procedures. . . . The agar plate on the opposite page shows the decisive germicidal action."

It must be remembered, however, that the laboratory experiments mentioned do not "definitely establish" the bactericidal value of the preparation under laboratory conditions, much less under clinical conditions. These experiments, moreover, do not show that Pulprotex as a germicide is superior to simple mixtures of known composition.

Pulprotex Liquid is alleged to be an effective agent in the treatment of odontalgia. According to the advertising literature, "The anesthetic in the liquid gives immediate relief in most cases." The Council has no reason to believe that this might not be true. The profession should know, however, whether Pulprotex Liquid is superior to eugenol U.S.P. and similar well-known substances for this purpose.

In its advertising literature, the firm attempts to justify the name of the product as follows: "Since its primary purpose is the protection of the pulp in all cases, we have coined the name, Pulprotex, as best identifying the product for you." Unfortunately, the name Pulprotex does not serve as a suitable mark of identification of the product. This name gives no indication of the composition of the product and might be applied with equal, albeit slight, justification to many other preparations. It would appear more plausible to assume that the firm's statement is a rationalization of their action in choosing a "catchy" name of commercial, but not scientific, significance.

In an advertising circular entitled "What Users Say About Pulprotex,"

there appear various testimonials alleged to have been written by dentists. While these "statements" are uniformly favorable, it must be remembered that testimonials are generally valueless as scientific evidence, particularly when they deal with products of unknown composition.

In an x-ray picture "graphically retouched," Pulprotex lining is shown in contact with the pulp. In a published but unsigned testimonial, it is asserted that Pulprotex has been successfully used in two cases of pulp exposure. No critical data are given and no contra-indications for this use of the product are mentioned.

After the Bureau of Chemistry had completed its analysis of Pulprotex and had prepared a product which appeared to simulate Pulprotex in properties, the Council enlisted the aid of two competent consultants, to whom were sent specimens of Pulprotex powder and liquid and substitutes for Pulprotex liquid and powder. The specimens were marked in code and both consultants were unaware of the identity of the specimens. The tests therefore were objective.

The following report was made by Louis I. Grossman:

A and A1. An examination of mixed cement A shows it to be whiter than A1. At 75 C., both A and A1 set within ten minutes. By mixing the material on a small slab and then placing the slab in the mouth, without allowing contact with saliva, both A and A1 set within four minutes. A and A1 were used as temporary filling materials in eleven and twelve cases, respectively. Both were found to be adequate in the sense that not too much disintegration of the filling material was noted even after from eight to ten days, and that no pulpal irritation was complained of. In addition, A and A1 were also used as bases for permanent fillings in two and four cases, respectively, where the cavities were deep. The material seemed hard enough to withstand the packing of amalgam, except in one of the cases in which A1 was used, wherein the material appeared to be weak and crumbled somewhat under the stress of packing the amalgam. This may possibly have been due to faulty technic in mixing the cement.

The material marked A1 was a substitute for Pulprotex. The formula of A1 is given in the chemist's report. The material marked A was Pulprotex.

The following report was received from Robert M. Stephan:

Samples C and D, when mixed to a thick paste, had a setting time in the mouth of about five minutes. On the slab, both set within forty minutes. Both yielded a fairly hard and cohesive mass. D yielded a more viscous mix, and did not flow so much in the mouth as C. Used as a temporary filling, both C and D proved satisfactory when kept in the mouth as long as two weeks (three cases), but did wear off on masticatory surfaces. D seemed slightly less irritating to the tongue than C immediately after insertion in the mouth. Neither seemed irritating thereafter.

If it is assumed that you intended these materials to be used as temporary fillings, it would seem that C and D are satisfactory. D would be slightly preferred since it yields a more cohesive mix.

The material marked "C" was Pulprotex. The material marked "D" was a substitute for Pulprotex and was identical with the material A1, given to Dr. Grossman.

These reports indicate that it is possible to obtain satisfactory zinc oxide-rosin preparations of known composition and that it is unnecessary for the dental profession to rely on products of secret composition.

REPORT OF THE BUREAU OF CHEMISTRY

Qualitative examination of the liquid indicated the presence of eugenol and a fatty oil. Halogens, nitrogen, sulfur and phosphate were not found.

Quantitative examination of the liquid yielded the following:

$$D_4^{30} = 1.028$$

$$N_D^{20} = 1.527$$

A vacuum distillation of the liquid indicated that the bulk of the product con-

sisted of a clear, colorless oil with the following properties:

$D^{30} = 1.056$.

B.P. 248° C.

These properties correspond to those of eugenol, U.S.P. The remainder of the product appeared as a light yellow, slightly viscous liquid, $D^{29} = 0.931$.

Qualitative examination of the powder indicated the presence of zinc, rosin and a salt of a lower fatty acid.

Quantitative examination of the powder yielded the following:

	Per Cent
Ash	69.1
Alcohol soluble	29.8
Lower fatty acid as $(CH_3COO)_2Zn.2H_2O$	0.42

Particle size distribution appeared to be as indicated:

Mesh	Per Cent
> 30	0
30—100	0.1
100—200	20.3
200—325	26.7
< 325	52.9

A synthetic product of the following composition appeared to simulate the setting time and physical properties of Pulprotex:

Powder	
Zinc oxide, A.D.R.	69.0
White rosin	29.3
Zinc stearate	1.0
Zinc acetate. $2H_2O$	0.7
Liquid	
Eugenol, U.S.P.	85
Olive oil, U.S.P.	15

(End of Chemist's Report)

Pulprotex (The L. D. Caulk Company) is essentially a zinc oxide-rosin and eugenol preparation which is of semi-secret composition, and which is promoted with exaggerated and misleading claims. It is therefore declared unacceptable for A.D.R.

A copy of the rules that govern the Council in the consideration of articles will be sent on request.

HAROLD L. HANSEN, *Secretary*.

PRESCRIBING SUGGESTIONS

THE rational use of drugs and chemicals is an essential part of dental practice. Over a period of years, the Council has issued numerous reports designed to aid the dentist in the selection of drugs and chemicals of demonstrated usefulness. Many of these are National Formulary and U. S. Pharmacopeial substances and are listed and adequately described in Accepted Dental Remedies 1939. In order that the dental profession may use acceptable and official products to best advantage, the following formulas have been suggested.

The Council appreciates the cooperation of George C. Schicks, assistant dean of Rutgers University, chairman of the Committee on Dental Pharmacy of the American Pharmaceutical Association, in the preparation of the formulas.

SERIES I

a)

℞	Metric Approx.	Apoth. Equivalents
Tab. Acidi acetylsalicylici	0.3 gm.	Gr. V

*Dentur tales doses No. XII

Sig: One tablet with a glass of water for pain. Repeat in half hour if necessary.

Note: Analgesic—pain.

Common name: Aspirin.

*Means give such doses.

b)

℞	Metric Approx.	Apoth. Equivalents
*Tab. Aminopyrinae	0.3 gm.	Gr. V.

**Dentur tales doses No. X.

Sig: One tablet with water for pain. Repeat in four hours if necessary.

Note: Analgesic—pain. Prescription required.

Usually, only a single dose is administered per day.

Dangerous for sensitive individuals, especially if given repeatedly.

Maximum dose—5 gr.

0.3 gm. = 5 gr. each dose.

*Proprietary name: Pyramidon.

**Means give such doses.

c)

℞	Metric Approx.	Apoth. Equivalents
*Tab. Acetophenetidini	0.3 gm.	Gr. V

**Dentur tales doses No. X.

Sig: One tablet with water—repeat in two hours for pain.

Note: Analgesic—pain.

When acetylsalicylic acid and aminopyrine are not indicated.

0.3 gm. = 5 gr. each dose.

Maximum dose—15 gr.

*Proprietary name: Phenacetin.

**Means give such doses.

d)

℞	Metric Approx.	Apoth. Equivalents
*Elix. Phenobarb. N.F.	45 cc.	℥ iss
**Elix. Aminopyrin. N.F. q.s. ad.	90 cc.	℥ iii

Misce.

Sig: ℥ ii in water every 3 or 4 hours as directed.

Note: Analgesic—sedative.

Each dose of ℥ ii contains about:

Phenobarbital	0.016 gm. or ¼ gr.
Aminopyrine	0.16 gm. or 2½ gr.

*Proprietary name for phenobarbital: Luminal.

**Proprietary name for aminopyrine: Pyramidon.

Aminopyrine is dangerous for sensitive individuals, especially if given repeatedly.

f)

℞	Metric Approx.	Apoth. Equivalents
Acetanilidi	2.1 gm.	Gr. XXXV
Caffeinae	0.3 gm.	Gr. V
Sodii Bicarbonatis	0.6 gm.	Gr. X

Fiat pulvis No. X.

Sig: One powder with half-glass of water. Repeat in three hours if not relieved.

Note: Analgesic.

Each powder contains:

Acetanilid	3½ gr. (0.22 gm.)
Caffeinae	½ gr. (0.03 gm.)
Sod. Bicarb.	1 gr. (0.06 gm.)

Maximum dose acetanilid—8 gr.

Administer with caution—powerful heart depressant.

Quantities should be governed by the treatment indicated.

Contraindicated in pain after surgical operation.
Relief for headache, neuralgic pains.
May be obtained by writing for Pulv. Acetanilidi Compositum—N.F.*
*N.F. National Formulary; p. 303.

SERIES II

a)

℞	Metric Approx.	Apoth. Equivalents
*Pulv. codein. sulf.	0.03 gm.	Gr. ½

M. ft. caps. dentur tales doses No. X
Sig: One every three or four hours with water.
Note: Analgesic—pain.
*Narcotic prescriptions must conform to the regulations of the Harrison Narcotic Law.

b)

℞	Metric Approx.	Apoth. Equivalents
Pulv. sodii bromidi	1 gm.	Gr. XV

M. ft. caps. dentur tales doses No. X
Sig: Contents of 1 capsule dissolved in half a glass of water.
Note: Preoperative and postoperative medication.

c)

℞	Metric Approx. gm.	Apoth. Equivalents gr.
Aethylis aminobenzoatis	0.75	xiss
Vanillini	0.03	ss
Sucrosi	8.12	cxxvss
Pulv. tragacanthae	0.25	iv
Carmini	0.01	1/6

Aq. dest. q.s.
M. fiat trochisci No. XXX
Sig: One dissolved on tongue to prevent gagging.
Note: Aethyl aminobenzoate is benzocaine.
Each troche contains: 1 grain benzocaine.
Used to relieve gagging and similar symptoms in taking impressions.
Topical anesthetic on mucous membranes.
Local anesthetic.

d)

℞	Metric Approx.	Apoth. Equivalents
Chlorobutanol	7.5 Gm.	gr. CXVI
Oil of clove, q.s. ad.	30.0 cc.	℥ i

M.
Sig: Apply on pledget of cotton to cavity of tooth.
Note: National Formulary title—odontalgicum.*
Local anesthetic for topical application.
The technic of application remains the same as in the use of the essential oil.
*May be obtained by writing for Odontalgicum N.F.

HYPERSENSITIVE DENTIN

e)

℞	Metric Approx.	Apoth. Equivalents
Benzyl alcohol	10.0 cc.	℥ iiss
Chloroform	20.0 cc.	℥ v

Benzyl alcohol in chloroform (30%)

℞	To make one ounce
Ether 2 parts	17.33 cc.
Alcohol 1 part	7.58 cc.
Thymol 1¼ parts	7.79 gm.

℞

Benzocaine	3.5 gm.	gr. Liv
Benzyl alcohol	17.5 cc.	ʒ ivss
Oil cloves	9.0 cc.	ʒ ii mxv

Ammoniacal silver nitrate

Preparation: Put three grams of silver nitrate crystals into a test tube and add one cubic centimeter of water. Heat this mixture over a flame to dissolve, being careful not to let it boil. Let it cool until you can hold it in the palm of your hand. Now add strong ammonia water (28%) slowly. At first a black precipitate will be formed. Keep adding ammonia and shaking the mixture until the black is *almost* all dissolved. Do not let it all dissolve or you will have too much ammonia, which is undesirable. The remaining black precipitate is removed by filtering through filter paper. The filtered solution is to be kept in a brown bottle to protect it from light to which it is sensitive.—Forsythe Interne's Manual.

Note: Colorless, almost odorless liquid.

Apply to sensitive or carious area and reduce with eugenol or 10 per cent formaldehyde solution. Application limited to posterior teeth because of stain.

Approx. 30 per cent silver diaminonitrate solution. It probably produces in carious areas a mixture of silver proteinates and reduced silver.

Said to be less toxic than silver nitrate.

The finely divided silver resulting from this procedure retards progress of decay in carious dentin.

Useful also in root canal operations.

Quantities make approximately 5 cc.

The Treatment of Hypersensitive Dentin, Report of the Council, J.A.D.A., 21:2050, November 1934.

FEDERAL TRADE COMMISSION ORDER ON CALOX TOOTH POWDER (ABSTRACT)

McKesson & Robbins, Inc., New York, has been ordered by the Federal Trade Commission to discontinue certain misleading representations in the sale of "Calox Tooth Powder."

Commission findings are that in newspapers and other periodicals and by means of radio broadcasts, the respondent company advertised "For teeth that 'Shine like the Stars' use Calox Powder," and that the product "Adds a charming sparkle to your smile—take this tip from Hollywood . . . use Calox Tooth Powder . . . the very same pure, safe, refreshing dentifrice that helps protect the radiant smile of Jean Parker, scores of other famous screen stars, and millions of people throughout the world."

The respondent stated that these excerpts from its advertisements were used in 1939, but that various other excerpts, which are mentioned in the findings of fact, were discontinued in 1937 and 1938. The findings show that among this latter group were representations to the effect that the product helps clean the proximal surfaces between the teeth, liberates nascent oxygen in the mouth, "fights" decay, "removes film and banishes stain"; that dentists advise the use of powder; that the sodium perborate in the respondent's product will keep gums firm and healthy, and other similar representations.

President's Message

ON TO BALTIMORE

THIS is the month of our Centennial Celebration. In every state in the Union, the members of the dental profession are coming together in their local organizations to celebrate the birth of American dentistry as an organized profession. It is meet and right that they should do this, for never again in the life of any living member will there be given an opportunity of like importance. The purpose of these local celebrations is twofold: first, to make it possible for every member of the profession to actively participate in celebrating in his local dental society an event of first importance in the history of the profession, and, secondly, to take advantage of these local gatherings, to encourage attendance at the meeting in Baltimore, March 17-20. Every member of the profession, no matter where he is located, should make preparations to be present.

There has been prepared a program that is unique in the annals of dentistry. No effort or expense has been spared to make it outstanding in its excellence. Fifty-four essayists, representing every section of the United States, will contribute of their knowledge and experience to the eighteen scientific sections, each of which will be presided over by an honorary chairman and vice-chairman.

Men of distinction outside of the profession will address the general sessions. A pageant depicting the progress of dentistry from its birth to date will be given on two successive evenings.

An historical and scientific exhibit such as has rarely if ever been equalled at any dental gathering will be on display during the entire celebration. The manufacturers' exhibit will also be outstanding, with an unusually large number of exhibitors. Too much credit cannot be given to the Centenary Committee for the magnificent program they have prepared for this occasion. By their unselfish service, they have placed the entire profession in their debt.

Nothing remains to make it an unqualified success except widespread attendance on the part of the profession. As President of the American Dental Association, I extend to you a cordial invitation to be present. Indeed, I urge you to do so. It should prove the greatest event in your professional life. To miss it is to miss an opportunity of a lifetime. Meanwhile, use your Centennial seals, and if you have not already done so, *send in your contribution* to the Centennial Committee. *This is important.* And now

ON TO BALTIMORE!

Arthur H. Merritt

ASSOCIATION ACTIVITIES

DENTAL CENTENNIAL DINNERS MARCH 11, 1940

MARCH 11, the members of more than 300 dental societies from coast to coast will hold dinners simultaneously in commemoration of dentistry's hundredth anniversary. Many of these dinners will be elaborate affairs, others will be less pretentious. Irrespective of the size and type of meeting, it is extremely commendable that the members of the American Dental Association in every state in the Union and in more than three-fourths of the component societies should unitedly pay their respects to the founders of organized dentistry.

The committee appointed by Arthur H. Merritt to handle the national aspect of the celebration has suggested the following program:

PROGRAM FOR THE DENTAL CONTENARY DINNERS

Date: Monday, March 11, 1940.
Time: 7:00 p.m.
Auspices: Component district societies throughout the United States.
Place: To be chosen by district societies.

SUGGESTED PROGRAM

7:00 p.m. - Dinner
8:00 p.m. - Program

Presiding officer: President of society or toastmaster.

A message from Arthur H. Merritt, President of the American Dental Association. (10 minutes.) (A written message, to be read by local secretary.)

A Century of Progress in Dentistry. Local dentist. (15 minutes.) (Material to be supplied by A.D.A. Committee.)

Our Contribution. Local dentist. (15 minutes.) (Material to be developed locally to bring out what the particular district and its state has contributed to dental progress.)

On to Baltimore. Local dentist. (10 minutes.) To be supplied by the Baltimore group, outlining what they have in store and inviting attendance.)

Looking Forward. Local dentist. (20 minutes.) (Inspirational talk of the evening, prepared to meet the situation existing locally. Basic material will be supplied by the A.D.A. Committee, with additions to be made by the local committee or individual.)

In some instances, it will not be possible for the component societies to adapt this program to the local situation, in which event they will prepare a program more suitable to their needs.

The Committee wishes to take this occasion to thank the state and component officers and every participating member for their cooperation and help in making these nation-wide centennial dinners possible.

A.D.A. Publicity Committee
for Centennial Dinners
LON W. MORREY, *Secretary*
HAROLD S. SMITH
O. W. BRANDHORST, *Chairman*

DENTAL CENTENARY CELEBRATION, BALTIMORE, MD., MARCH 18, 19, 20, 1940

THE Committee on Scientific Sessions of the Dental Centenary has approved "Dental Libraries" as an additional section to be included in the program for

the Centennial Celebration in Baltimore.

PROGRAM
DENTAL LIBRARIES

THE FLORENTINE ROOM—LORD BALTIMORE HOTEL

12:30 p.m., Tuesday, March 19

Marcus L. Ward, Honorary Chairman.... .....Ann Arbor, Mich.
Gerald D. Timmons, Honorary Vice Chairman .....Indianapolis, Ind.
Esther Ann Horine, Secretary. President, Baltimore Chapter, Special Libraries Association.

"Beginning and Growth of Dental Libraries"
By George B. Denton (Ph.D.), Chicago, Ill.

"Need for Improved Library Facilities in the Interest of Dental Research"
By William J. Gies (Ph.D., Sc.D., LL.D.), New York, N. Y.

"Recent Changes in the Index of Dental Literature"
By Josephine P. Hunt (Librarian, American Dental Association), Chicago, Ill.

DEDICATION OF THE W. K. KELLOGG FOUNDATION INSTITUTE

THE W. K. Kellogg Foundation Institute will be dedicated April 3, at the University of Michigan, School of Dentistry, Ann Arbor.

The program of the dedicatory services is as follows:

10 a.m. Dedication of the W. K. Kellogg Foundation Institute, in the auditorium of the Rackham Building.

11 a.m. Address by Clarence O. Simpson, St. Louis, Mo., on a phase of radiology of interest to dentists.

12:30 p.m. Luncheon, followed by an address by Preston W. Slosson on the present war situation in Europe.

2:00 p.m. Unveiling of the Miller Memorial.

2:30 p.m. Inspection of the Kellogg Foundation Institute.

RESEARCH COMMISSION

SURVEY OF CERTIFIED INLAY CASTING WAXES

(January 31, 1940)

SAMPLES of all inlay casting waxes which had been certified to the Research Commission by the manufacturers were procured on the retail market by the Research Commission and were tested by the A.D.A. Research Associates at the National Bureau of Standards.

The following waxes were found to comply with all requirements of A.D.A. Specification No. 4 and with all requirements of the Research Commission regarding certification:

CERTIFIED INLAY CASTING WAXES (A.D.A. SPECIFICATION NO. 4)

Wax	Manufacturer or Distributor
Caulk Blue	The L. D. Caulk Company
Kerr-Blue-Hard	Kerr Dental Mfg. Company
Maves Green	The Heidbrink Company
Security	The Cleveland Dental Mfg. Company
Sterling	Baker & Co., Inc.
Taggart's Green	Mizzy, Inc.

AMERICAN DENTAL ASSOCIATION MEMBERSHIP

NUMBER OF MEMBERS†	
Alabama	369
*Arizona	97
Arkansas	194
Army	229
*California	1,729
*Colorado	480
*Connecticut	890
Delaware	63
*District of Columbia	446
*Florida	480
Foreign	15
Georgia	438
Idaho	101
*Illinois	4,287
Indiana	1,147
*Iowa	1,149
Hawaii	164
Kansas	608
*Kentucky	550
Louisiana	406
Maine	222
Maryland	415
Massachusetts	1,958
*Michigan	1,779
*Minnesota	1,707
Mississippi	240
Missouri	1,397
*Montana	197
Nebraska	568
Nevada	37
*New Hampshire	165
*New Jersey	1,976
*New Mexico	88
New York	5,066
*North Carolina	541
North Dakota	175
Navy	193
Ohio	2,464
Oklahoma	502
Oregon	439
Pennsylvania	3,477
Public Health Service	125
Philippine Islands	3
Puerto Rico	78
*Rhode Island	259
*Southern California	1,737
South Carolina	213
South Dakota	177
*Tennessee	531
Texas	1,232
*Utah	236
*Vermont	110
*Virginia	526
Washington	718
West Virginia	361
*Wisconsin	1,631
*Wyoming	78
Veterans Administration	116
Panama Canal Zone	21
Total Regular Members—1939	45,600

†December 31, 1939.
*Over the top for 45,000.

JUNIOR MEMBERS	
Atlanta Southern Dental College	11
Baylor University	60
Chicago College of Dental Surgery	120
College of Physicians & Surgeons	103
Columbia University	145
Creighton University	2
Georgetown University	108
Harvard University	2
Indiana University	57
Kansas City-Western Dental College	93
Loyola University	80
Marquette University	119
Medical College of Virginia	29
New York University	74
North Pacific College of Oregon	122
Northwestern University	5
Ohio State University	112
State University of Iowa	31
Temple University	45
Texas Dental College	60
Tufts College	4
University of California	15
University of Buffalo	14
University of Detroit	28
University of Illinois	17
University of Louisville	14
University of Maryland	44
University of Michigan	18

University of Minnesota	25
University of Nebraska	2
University of Pennsylvania	5
University of Pittsburgh	22
University of Southern California	156
University of Tennessee	16
Washington University	19
Western Reserve University	103
Total junior members	1,880
Affiliate members	113
Total—All members	47,593

PERCENTAGE*

Connecticut	148.09
New Mexico	139.68
Minnesota	137.66
District of Columbia	136.81
New Jersey	131.82
Wisconsin	120.64
Utah	115.12
Wyoming	114.76
Illinois	113.74
Vermont	113.40
Michigan	113.16
New Hampshire	113.01
Florida	110.83
North Carolina	110.18
Rhode Island	107.92
Montana	107.65
Iowa	106.78
Virginia	106.48
Arizona	103.19
Tennessee	102.71
Kentucky	101.29
California	100.26
Southern California	100.26
Colorado	100.21
Ohio	99.96
Oklahoma	98.82
Texas	98.48
Delaware	98.44
Indiana	96.88
Pennsylvania	93.49
Nebraska	91.61
Alabama	90.89
Kansas	90.34
Massachusetts	90.27
Nevada	90.24
Missouri	89.95
North Dakota	89.74
Mississippi	87.91
South Carolina	86.94
West Virginia	85.09
Washington	83.59
Maine	83.50
Louisiana	83.03
New York	82.39
South Dakota	81.19
Maryland	79.96
Arkansas	79.51
Oregon	78.82
Georgia	75.78
Idaho	66.45

*Percentage of quota obtained by state societies on basis of total membership of 45,000, as of December 31, 1939.

RADIO BROADCAST BY ARTHUR H. MERRITT
NBC BLUE NETWORK

MONDAY evening, March 11, 6:05 Eastern Standard Time Arthur H. Merritt, President of the American Dental Association, will deliver a five-minute message on the Dental Centenary over the National Broadcasting System's Blue Network. Tell your patients to tune in on your local NBC station.

A COMMITTEE ON NATIONAL DEFENSE

AT the suggestion of Brigadier General Fairbank, a committee on national defense has been appointed by the President of the American Dental Association, Dr. Merritt, as follows: C. Willard Camalier, chairman, Washington, D. C.; Leuman M. Waugh, New York, N. Y.; Edward H. Bruening, Omaha, Nebr.; J. Ben Robinson, Baltimore, Md.; C. G. Brooks, New London, Conn.; J. T. O'Rourke, Louisville, Ky., and H. O. Lineberger, Raleigh, N. C.

COMMITTEE ON LEGISLATION

JUDICIAL CONSTRUCTION OF WHAT CONSTITUTES THE PRACTICE OF DENTISTRY

By Leslie Childs, Indianapolis, Ind.

SINCE the practice of dentistry is so widely regulated by statutes, the question of what constitutes the practice within the terms of such enactments becomes one of great importance. The subject has frequently been litigated, but cannot be covered by any general rule because each case has necessarily been decided in the light of the terms of the statute involved, in connection with the claimed acts of violation.

However, the trend of judicial reasoning in construing dental practice acts, in respect to what constitutes a violation of their terms, can be illustrated by a brief review of a few leading cases of this class; for example, Jacobs vs. Board of Dental Examiners, 189 Cal. 709,209 Pac. 1006.

FACTS IN THE CASE

Here, the defendant, a dentist, was charged with unprofessional conduct under the California Dental Act, for alleged aiding and abetting of an unlicensed person to practice dentistry unlawfully. The section of the act involved, among other things, defined the practice of dentistry as follows:

Any person would be deemed to be practicing dentistry who ". . . (2) for a fee, salary or reward, paid directly or indirectly, either to himself or to some other person, performed an operation of any kind upon or treated diseases or lesions of the human teeth or jaws or corrected malimposed positions thereof."

The acts of the unlicensed person, which were performed in the office of which the defendant was manager, were set forth in the report, in part, as follows:

On the first visit, F. . . . [unlicensed person] made a plaster of Paris mold or cast of Boyiarides' [patient's] mouth for the purpose of getting the measure for the plate. On the next day F. . . . took a "wax bite" of the mouth of Boyiarides by placing a piece of wax in his mouth and telling him to bite into it. On the third visit, F. . . . put a wax plate set with teeth in Boyiarides' mouth . . . causing the patient to bite into the wax mold for a "try-in." On the fourth visit, the finished plate was delivered by F. . . . to Boyiarides, who paid F. . . . $10, taking his receipt for the money.

The defendant, among other things, it appears, took the position that the foregoing described acts did not constitute an "operation"; that is, the practice of dentistry, within the meaning of the statute quoted from heretofore. The higher court, in denying this contention and in affirming a judgment of the lower court revoking the defendant's license, reasoned:

It does not require the performance of a surgical operation to bring one within the purview of the law. The words "operate" and "operation," technically used in connection with surgery, mean "to perform some manual act upon the body of the patient, usually with instruments. . . ." (Century Dictionary.) They have also a plain ordinary meaning, in the light of which this act may and, we think, should be construed.

The particular purpose to be accomplished

by that portion of the section germane to this appeal is manifestly to prevent the doing of those things about or upon the human teeth, or jaws, which require skill, adequate training and understanding in their performance. The section provides that one who performs an operation of any kind upon those portions of the human anatomy shall be understood to be practicing dentistry, but that nothing within the act shall prohibit "an unlicensed person from performing merely mechanical work upon inert matter in a dental laboratory."

The Legislature has very plainly indicated what work may be done by an unlicensed person in connection with the practice of dentistry in this state. The acts done by the appellant [defendant] in the present case do not fall within the permission of the statute. The judgment is affirmed.

A like conclusion was reached in Whetstone vs. Board of Dental Examiners, 87 Cal. App. 156,261 Pac. 1077, which involved the question as to whether the acts of a dental nurse in treating teeth constituted the practice of dentistry within the meaning of the California Dental Act. Here, as in the foregoing case, the defendant's license was suspended on the grounds that he had aided and abetted an unlicensed person in the practice. In reasoning upon the question, and in upholding the suspension, the court said:

> Where instruments are used in the removal of any accumulations upon the teeth, where medicines are employed in treating the gums of a patient, where paste is placed upon the teeth as a part of such treatment and thereafter removed by a revolving brush, propelled by a power not stated, which is used in removing the paste and as a part of the process of cleaning them or as a part of the treatment, we think a charge of practicing dentistry as defined by the Dental Act has been made out and, if one is charged, as in this case, with aiding and abetting an unlicensed person to practice dentistry who, in his office, performs such acts upon his patient, a judgment so finding is supported by the testimony.

The foregoing cases aptly illustrate the trend of judicial reasoning in construing dental practice statutes, in respect to what constitutes the practice of dentistry. Here, as a usual rule, the tendency is to give effect to the legislative intent in the enactment of such laws rather than to follow any strictly technical construction of the terms employed.

Accordingly, the courts are alert in declining to be bound by a construction that, on the acts charged, would be oppressive and not within the legislative purpose. For illustration of the application of this rule, State vs. Medcraft, 167 Wash. 274, 9 Pac. 2d. 84, may be examined with profit.

Here, the Washington statute, considerably abbreviated, defined the practice of dentistry as follows:

> Any person shall be regarded as practicing dentistry within the meaning of this act who, for a fee . . . shall perform dental operations of any kind upon any human being . . . or who shall treat . . . any disease . . . or lesion of the oral cavity, teeth, gums, maxillary bones, or extract teeth, or repair or fill cavities.

DENTAL TECHNICIAN TREATS TOOTH

In the following case, the defendant was employed in a dental office as a "dental technician." On a certain evening, the witness called at the office complaining of toothache. The defendant filled the cavity of the tooth with oil of cloves for the relief of the pain. No charge was made for this service.

On the foregoing facts, the defendant was convicted of practicing dentistry without a license. On appeal, the higher court, in reviewing the record and in reversing the judgment, among other things, said:

> In our opinion, the evidence does not disclose proof of any facts sufficient to support a conviction of the crime charged. . . . It is clear that [the witness] needed dental attention, and that he complained of a toothache. It cannot be held that the temporary first aid administered by appellant [defendant] under the circumstances here shown constituted practicing dentistry, within the

terms of the statute. [The witness] admitted that appellant did no work on his mouth other than the placing of the cotton, and that the witness was told to return the next evening. . . . The judgment . . . is reversed, with instructions to dismiss the proceedings.

So, while the courts will not, as a general rule, resort to harsh constructions of dental practice statutes, they are equally alert in frowning upon technical defenses, the upholding of which would violate the spirit of such enactments. For illustration:

DIAGNOSIS AS PRACTICE OF DENTISTRY

In Noble vs. State, 44 Ohio App. 10,184 N. E. 258, the defendant was convicted of practicing dentistry without a license. The acts complained of consisted in the examination of patients, and the making of a written diagnosis of the work to be done; this being passed on to licensed dentists for execution.

On the foregoing facts, the defendant took the position that his acts did not constitute the practice of operative dentistry, which required a license, but rather mechanical dentistry, for which no license was required. In denying this contention, and in affirming the judgment below, the court, in part, said:

It is earnestly asserted that no license is required for doing mechanical dentistry, but only for practicing operative dentistry. . . . If "mechanical dentistry" be the making of plates or sets of teeth, or fillings or crowns, and so forth, from impressions taken by a licensed dentist, then we are inclined to agree that such labor need not be covered by state license. But we include in the term "operative dentistry" all activities and examinations of the mouth of the patient leading to, and the making of, such impressions. . . .

The patient goes to a dentist to ascertain whether the teeth or jaws need treatment for disease or dental work, or whether there are any malpositions or malformations that require attention, and the successful determination of such needs rests and depends upon the learning, skill and experience of the members of the dental profession, and presumably possessed by them exclusively. . . . We are of the unanimous opinion that this statute is constitutional, and that diagnosis is indispensably essential to and necessarily comprehended by and within the terms used to define operative dentistry or practicing dentistry in section 1329, General Code. . . . Judgment affirmed.

CONCLUSION

The foregoing cases were, of course, decided in the light of their facts and the provisions of the dental statutes involved, as all cases of this class must necessarily be decided. However, this in no way detracts from their value as illustrations of judicial reasoning on the subject.

Here, as has been previously noted, the tendency of the courts in construing dental practice statutes is to weigh the spirit as well as the letter; in other words, to give force to the legislative intent by a broad construction rather than risk its defeat by a narrow interpretation of the terms used. And, as examples of the application of this rule of judicial construction, the cases reviewed are of force and value.

1520 East Tenth Street.

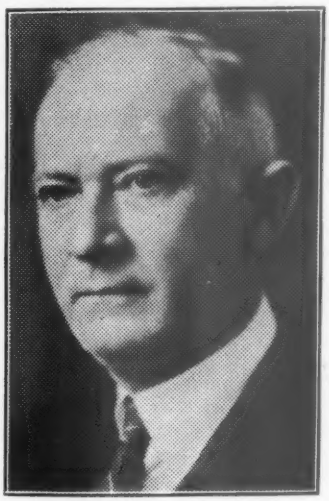
OBITUARIES

OSCAR E. BUSBY, D.D.S.
(1877-1939)

OSCAR E. BUSBY was born in Woodville, Texas, in 1877; died at his home in Dallas, December 22, 1939.

He was graduated from Baylor University, at Waco, Texas, in 1894 and attended Tulane University Dental School and the Atlanta Dental College, from which he was graduated in 1897.

Dr. Busby was past president of the Dallas County Dental Society and of the Southwestern Society of Orthodontists; a former vice-president of the American Association of Orthodontists; a former honorary vice-president of the First International Orthodontic Congress; former vice-president of the Second International Congress and the World's Congress of Orthodontia; a member of the American Association of Orthodontists, the European Society of Orthodontists, the Texas Society of Orthodontists, the Dallas County Dental Society, Texas State Dental Society and the American Dental Association.

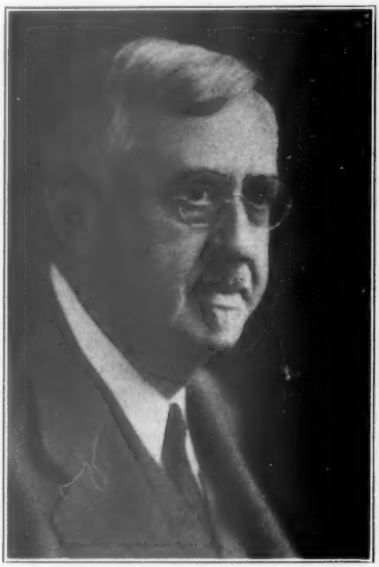


Oscar E. Busby, D.D.S.

He was a member of the faculty of the Baylor Medical School and the Baylor University College of Dentistry.

HOWARD SHIMER SEIP,
A.B., A.M., D.D.S.
(1866-1939)

HOWARD SHIMER SEIP was born September 17, 1866, in Bath, Pa.; died at his home in Allentown, Pa., December 22, 1939, death coming peacefully and unexpectedly after a pleasant evening in the company of his grandson, his only living descendant.



Howard S. Seip, D.D.S.

After completing his early education in the public schools of Bath, Pennsylvania, Dr. Seip entered Muhlenberg College, Allentown, which his father, the Rev. Theodore L. Seip, served as president from 1885 to 1903. On his graduation from Muhlenberg

College, June 25, 1885, with the bachelor of arts degree, he entered the dental school of University of Pennsylvania, graduating in 1887.

During his more than fifty-two years of active practice in the City of Allentown, Dr. Seip always displayed a keen interest in the advancement of his profession. Motivated by an earnest desire to keep abreast of scientific knowledge in dentistry, he was a familiar figure at all scientific meetings held within a reasonable radius of his city. On all occasions, his jovial disposition and love for good fellowship made him an ideal companion and won for him countless friends.

An active member of the Stomatological Society of Philadelphia and the Delta Sigma Delta Fraternity, Dr. Seip also played an important rôle in organizing the Allentown Dental Society, which sponsored and carried to completion one of this country's first programs on dental care and dental health education for the children of the public schools.

That his interests and efforts on behalf of his profession extended beyond the limits of his own community was indicated by his election to the presidency of the Pennsylvania State Dental Society in 1914, in which capacity he served with honor and distinction.

In addition to his many noteworthy efforts toward the advancement of his profession, Dr. Seip gave liberally of his time and talent in support of all forces and institutions of a character building nature, especially in the fields of education and religion.

Dr. Seip was united in marriage on April 15, 1890, in the City of Allentown to Anna E. Anewalt, who, with one grandson, J. Peter Trexler, survives.

OTTO G. KRAUSE, D.D.S.
(1876-1940)

Otto G. Krause, widely known practicing dentist and a member of the Marquette University Dental School faculty for thirty-five years, died Tuesday, January 30, at his home in Milwaukee, Wis.

He was born in Columbus, Wis., July 4, 1876. In 1903, he was graduated from the dental department of the old Milwaukee Medical College, which later was absorbed by Marquette University. He joined the faculty of the college the next year. His service was the second longest on the Marquette University faculty.

Dr. Krause's special field was prosthetic dentistry. He was professor of prosthetic dentistry and head of the division of crown and bridge work. He was president of the Wisconsin State Dental Society in 1914-1915, and was made a Fellow of the American College of Dentists in 1925.

HUGO FRANZ, D.D.S.
(1869-1939)

Hugo Franz was born in 1869 in Germany, and received his dental education there. Later, he decided to take a postgraduate course in America and he matriculated in the Chicago College of Dental Surgery, graduating in 1893. He then settled in Chicago, diligently practicing his profession, until his passing April 27, 1939, at the age of 70.

Always courteous, he appealed to his confrères and a cultured following as a true exponent of the profession he dignified. We need his like to perpetuate the high standards without which no organization can long survive.

MURRY GUGGENHEIM
(1858-1939)

November 15, 1939, Murry Guggenheim, philanthropist of New York, died after a brief illness. By reason of his gift, with that of Mrs. Guggenheim, of the Murry and Leonie Guggenheim Dental Clinic, he was known to dentists throughout the world. And for this gift, his name will go down in dental history beside the names of Forsyth and Eastman.

Mr. Guggenheim was one of the seven sons of Meyer Guggenheim, who came to this country from Switzerland as a young man and founded one of the great fortunes of his time.

The clinic building with its equipment represents an investment of more than $1,000,000. An endowment of $5,000,000 was left, by the terms of his will, to carry out the broad purpose of the Foundation.

Mr. Guggenheim was of a very retiring disposition, modest and averse to public ap-

pearance, in manner both genial and gentle. On his occasional visits to the Clinic, his eyes would sparkle with affection and pleasure as he chatted with children in the chair or waiting to be treated. Here his desire was to prevent and alleviate dental disease with its attendant suffering and physical impairment, to the end that the children of the City of New York might have added happiness and grow to strength and health in maturity.

In the passing of Murry Guggenheim, dentistry loses one of its most helpful friends, for in helping dentistry to bring dental disease in children under control, he has helped dentistry itself and the profession owes him a debt it can never repay.

JOHN OPPIE MCCALL.

DEATHS

BEAM, AUGUSTUS PITT, Shelby, N. C.; Atlanta Southern Dental College, 1917; died November 12, 1939; aged 46.

BELL, WILLIAM FORREST, Asheville, N. C.; School of Dentistry, University of Pennsylvania, 1911; died December 2, 1939.

BRISTOR, JOHN H., Mansfield, Ohio; Ohio State University, College of Dentistry, 1899; died December 17; aged 65.

CHURCHILL, GUY R., Chicago, Ill.; Chicago College of Dental Surgery, 1902; died December 24; aged 61.

COOK, CLINTON D., Maywood, Ill.; University of Illinois College of Dentistry, 1900; died January 15.

DUNN, JOHN THOMAS, Sulligent, Ala.; Vanderbilt University, School of Dentistry, 1900; died November 8, 1939; aged 64.

GAST, AUGUST T., St. Louis, Mo.; Washington University School of Dentistry, 1905; died November 29, 1939.

GILBERT, GORDON L., Birmingham, Ala.; University of Tennessee, College of Dentistry, 1924; died December 12, 1939; aged 42.

HORVATH, KOLMAN C., Lorain, Ohio; Ohio State University College of Dentistry, 1930; died November 20, 1939; aged 33.

MURPHY, F. J., St. Paul, Minn.; Creighton University, Dental Department, 1917; died January 23; aged 46.

SALTSMAN, F. B., LaGrange, Ga.; Atlanta Southern Dental College, 1919; died November 24, 1939; aged 50.

SIMMONS, WINFIELD SCOTT, Guyton, Ga.; Atlanta Southern Dental College, 1890; died December 4, 1939; aged 81.

SMITH, RAY R., Columbus, Ohio; Ohio State University College of Dentistry, 1903; died December 12, 1939; aged 59.

SOWLER, ALEXANDER M., Chicago, Ill.; Chicago College of Dental Surgery, 1898; died January 6; aged 67.

STOUT, ROSCOE L., Chicago, Ill.; Northwestern University Dental School, 1909; died January 23; aged 56.

THORNBERRY, A. E., Cambridge, Ohio; Ohio State University College of Dentistry, 1908; died November 29, 1939; aged 51.

VAN GIESON, RANSFORD B., Newark, N. J.; New York College of Dentistry, 1900; died December 7; aged 60.

WILDASON, FRANK A., Indianapolis, Ind.; Indiana University School of Dentistry, 1899; died recently; aged 64.

WILLIAMS, JUSTUS WRIGHT, Fort Wayne, Ind.; Baltimore College of Dental Surgery, 1897; died December 11, 1939; aged 66.

BUREAU OF PUBLIC RELATIONS

INSURANCE OF CHILDREN AGAINST CARIES

By Henry C. Sandler, D.M.D., Brooklyn, N. Y.

IT has been held that the treatment of dental caries is a public health responsibility. This premise is not, at present, acceptable to either public health officials or the dental profession. That we have a professional and civic responsibility toward our children is recognized by all, but the approach to the problem has been more emotional than scientific.

Haven Emerson defines public health as the "application of the science of preventive medicine, through government for social ends." If dental caries were a preventable disease, its prevention would definitely be the responsibility of government under this definition. Unfortunately, we do not know how to prevent dental caries, and, strictly speaking, there is no such thing as a science of preventive dentistry in the sense of preventive medicine. The nearest approach to prevention in dentistry is really a treatment program which stops the progress of caries by means of operative interference before pulpal involvement.

The activities of public health agencies may some day include the treatment of the sick, but, for the present, despite the social changes of recent years, there is little likelihood of a radical departure from accepted public health principles. It seems reasonable that dental activities in public health and social service be directed toward service for indigent children since they are unable to care for themselves. It is an accepted function of public health activity to provide, within budgetary limitations, treatment of diseases which may impair the health of a child. In the City of New York, there are more than a million children of school age. More than one-third of these, about 400,000, come from families that are "legally indigent." These children are, theoretically, eligible to treatment in the various department of health dental clinics, but it can be readily seen that with sixty-three civil service dentists and about 50 WPA dentists working three hours a day, it is impossible to provide adequate care for them all. The field of public health dentistry, even if limited to these children, is large indeed. As for the remaining 600,000, they must seek treatment of their own volition from the dentist in private practice. The dentist who sees any great number of children knows that they are not receiving any approximation of adequate dental care, although their parents can afford to provide it. As a consequence, despite our technical ability to prevent it, a new generation of dental cripples is continually in the making.

There are about 6,500 dentists in Greater New York, and upon these men rests the responsibility of caring for these children. If adequate service were given, there would be little wasted office time for the dentists of New York City. With the situation as it actually exists, only a small percentage of these children, who can afford dental service, actually receive it, and there are few dentists who do not waste many precious hours waiting for patients. Similar situ-

ations exist in other large urban communities of the United States.

Social welfare and public health officials are concerned, particularly at this time, with the rural child, who is receiving considerably less public health service than his city cousin. City children receive the benefits of the economies possible in concentrated enterprise and most of the benefits of social service. Any plan which does not take the rural child into consideration perpetuates this discrimination. It is possible, with some changes, to use for the rural child a plan similar to the one outlined below. It is with these facts in mind that the following plan is proposed.

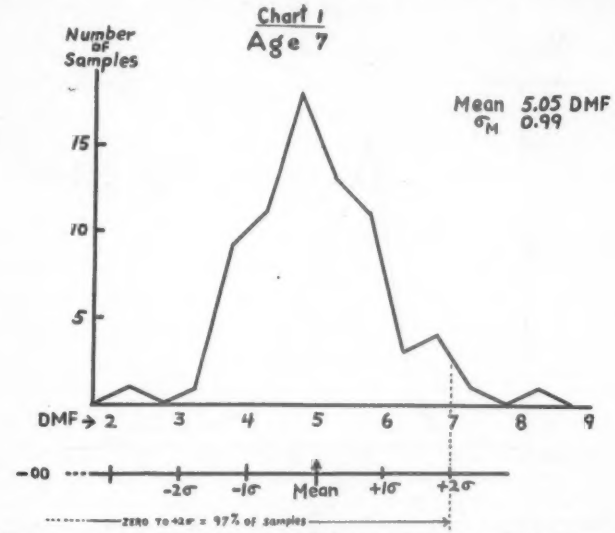


Fig. 1.—Frequency distribution of average DMF; seventy-two samples representing 39,664 white boys between ages of 6 and 8. (Bull. 226 U. S. P. H. S., State of New Jersey.)

WHY THE PLAN IS LIMITED TO CHILDREN

An adult program of any kind is complicated by many factors. The cost is high.[1] The program is not of a "preventive" nature. It is much more difficult to measure the needs of adults, and there are no uniform methods or standards of treatment.

On the other hand, a children's program is the nearest thing to a preventive one. The cost can be kept within the probable willingness of parents to pay; and measurement of the needs as well as the standards of treatment can be more readily ascertained.

INSURANCE OR GROUP PRACTICE

It is proposed to insure children against caries or to provide complete, adequate treatment in accordance with accepted dental practice. There are two fundamental factors in insurance of any kind: There must be a measurable risk and a distribution of the cost among a large enough number of premium payers.

Of course, the degree of caries is not predictable with certainty in any individual; but, given a large enough group of samples, deductions can be made which can be applied to the "universe" from which they are drawn. It can be proved that more than 95 per cent of cases will fall within plus or minus twice the standard deviation from the mean. This provides a measurement of any degree of risk.

The distribution of the cost depends on how low the cost will be, and, perhaps to an even greater extent, on the type and amount of publicity the plan receives. The plan might be regarded by some as "dental insurance" and by others as "group practice"; but there is no need to quibble over a name as long as the idea proves practicable.

ELIGIBILITY

All children between the ages of 3 and 10 would be eligible for enrolment. Upon enrolment, continuous dental treatment would be provided to the age of 16, but no child could be newly enrolled after 10 years of age.

Every dentist would be eligible to join with the others in his community in a non-profit-making organization which would have direct association with the local dental societies and health and welfare agencies.

CAPITALIZATION AND FINANCING

It is possible that some one of the local philanthropic organizations might be induced to finance a plan designed to benefit the children of the community, particularly if some means of including the indigent and semi-indigent children could be worked out with public health authorities.[2]

Edward S. Godfrey, Jr., commissioner of health of New York State,[3] said recently:

The public is not so much concerned with the mopping-up of the residuum of epidemic disease as with attacking the large problem of preventing suffering and premature death. Today the successful treatment of many diseases demands a knowledge of the disease process in the patient before the patient feels ill. . . . Modern preventive medicine can only be practiced by groups. . . . *It is not unlikely that the state will take an interest in facilitating medical practice of this type.*[3] [Italics not in the original.]

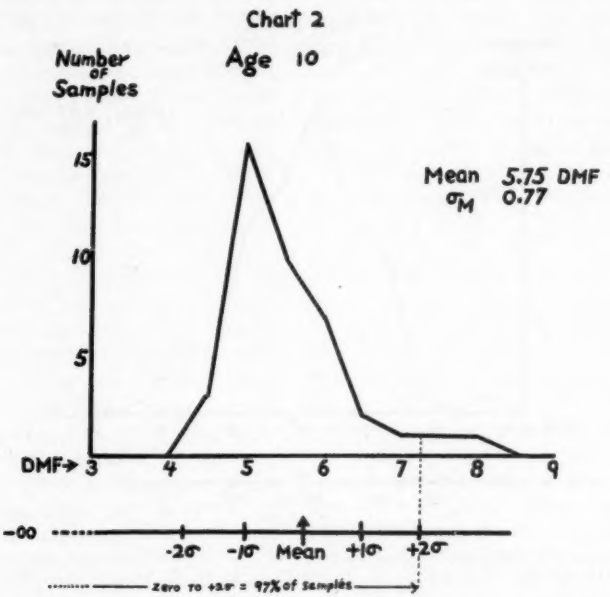


Fig. 2.—Frequency distribution of average DMF; thirty samples, representing 33,339 white boys between ages of 9 and 11. (Bull. 226 U. S. P. H. S., State of New Jersey.)

Assuming that neither private philanthropy nor public health authorities are willing to assume the capitalization, it is still quite possible to finance such an enterprise as other cooperative business enterprises are financed. If every dentist who wishes to become a partner in the group were required to invest $20 for the privilege, a membership of 1,000 dentists in Greater New York would provide a fund of $20,000, which should be adequate for capitalization and should provide some reserve as well.

Let us take New York City as an example and qualify the plan to meet conditions in other communities. Of the 6,500 dentists in New York City, about 1,000 are specialists of various kinds and about 1,000 more could be classified as "Fifth Avenue" dentists, who would not care to accept child patients. Of the remaining 4,500 rank and file dentists, it would not be unreasonable to expect the enrolment of 1,000. With continued success, a larger percentage could be expected to enroll.

Once the plan was working, the operating expenses of the organization would be derived from the premiums paid by the patients. With any fair volume, it is estimated that 10 per cent of the gross income should be adequate to pay all administrative expenses.[4] As the volume increased, the percentage cost of administration should decrease, more money becoming available for such services as publicity and education.

SUPERVISION

One of the difficulties in all large-scale undertakings of this kind is to provide assurances that the public will receive the benefits for which they are paying. In commercial insurance, the Insurance Commission has set up certain standards of supervision and reserves to safeguard the public. In the case of the medical or the dental service, however, the commission has ruled that no cash reserve requirements are necessary, since the benefits are payable in service, and this is always procurable.

Most dentists are honest and conscientious; but the temptation to neglect a patient whose fee will be paid in any case is great, and continuous neglect of patients would jeopardize the reputation of the plan and the profession. It is therefore imperative that safeguards be provided against gross substandard service. It cannot be expected, of course, that every dentist will become a pedodontist overnight. But it is certainly possible for a representative group of dentists familiar with children's dentistry to set up a list of standards well within the ability of the average dentist.

Supervision is obnoxious to all dentists. We have been our own masters too long to be willing to tolerate criticism, no matter how justified. It is proposed, therefore, that a rotating self-supervision system be incorporated in the plan whereby each dentist agrees to examine children for one day a year without pay at various central examining stations, to be provided through the administrative office.

When the child was examined, the examining dentist would have no knowl-

TABLE 1.—RESULT OF DENTAL EXAMINATION OF 100,658 WHITE BOYS*

Average Age	Number of Samples	Number of Children	Average DMF† per Child	Standard Error of the Mean
7	73	39,664	5.05	0.99
10	30	33,339	5.75	0.77
13	30	27,655	6.05	1.06

*Random selected samples from Bulletin 226 U.S.P.H.S.
†Decayed, missing or filled teeth.

edge of the identity of the patient or of the dentist whose work he was scrutinizing. He would be strictly cautioned against comment or gesture which might result in patient dissatisfaction. The patient would be dismissed with no information, but the result of the examination would be mailed by the office force directly to the dentist who did the work. He would, in turn, recall his patient at his convenience. Repeated failure to adhere to the standards might be due to lack of skill in children's dentistry or to dishonesty. If the former, an attempt to aid the dentist through refresher courses would be beneficial to all concerned. If the latter, the plan should provide proper disciplinary measures.

Table 2.—Number of Carious, Filled and Missing Teeth Among 2,232 Boys of Hagerstown, Md.*

	Age									
	6	7	8	9	10	11	12	13	14	15
Number of children	171	197	231	253	270	262	299	267	199	83
Number of carious permanent teeth	40	108	204	346	456	484	671	630	688	406
Number of permanent teeth to be extracted or missing	0	5	10	35	88	77	121	160	148	98
Number of carious deciduous teeth	862	958	1,198	1,042	741	354	165	44	24	8
Number of filled permanent teeth	3	3	45	86	128	183	320	307	228	86
Number of filled deciduous teeth	51	54	41	37	57	24	4	1	1	0
Total DMF	956	1,128	1,498	1,546	1,470	1,122	1,281	1,152	1,089	598
Average DMF per child	5.6	5.7	6.5	5.5	5.6	4.3	4.3	4.3	5.7	7.3

*Compiled from Klein, Henry, Palmer, C. E., and Knutson, J. W.: Studies on Dental Caries. Pub. Health Rep., **53**, No. 19, May 1938.

AUTHORITY AND ADMINISTRATION

Authority to organize groups for this purpose must be obtained from the state legislature. It is proposed that the group be incorporated as a non-profit dental service organization, membership in which is restricted to dentists. The number of dentists should represent at least 10 per cent of the total number practicing in the area. For example, in New York City, 650 should be the minimum number of partners in the enterprise.

The charter or constitution should provide as democratic a form as possible to insure a voice for the "man at the chair," and to prevent self-perpetuating office holders. This is essential if cooperation and enthusiasm are to be maintained. Organized dentistry should have an official voice in the management and policies through representation on the board of directors. Lay members and social service organizations would also be represented in the directorate.

A salaried executive director or executive secretary would be elected, and he would be charged with the responsibility of all administrative activities. He need not be a dentist, but he must be a capable executive and a good business manager. He would be paid in proportion to the administrative income, and his qualifications should necessarily entitle him to a fairly substantial salary. Clerical, statistical and publicity staff would be

provided as income and volume warranted and as needs developed.

PATIENT-DENTIST RELATION

The enrolling parent would have a free choice of any dentist listed in the group. It is expected that a patient would retain a dentist for at least one year. In the event that the patient wished to change dentists after the work had been started, a prorata fee would be paid each dentist.

If a child should prove unmanageable to three successive dentists, provision could be made for the withdrawal of the patient and refunding of the fee. This would involve the payment of no fee to the dentists. The risk of losing the fee would encourage dentists to exercise greater patience in the treatment of children.

All the work would be done at the office of the dentist, who would use his own materials and methods, and there would be no restrictions in judgment, technic or office management. He would, of course, assume all professional and legal responsibility. He would assume the moral responsibility of accepting all patients who present themselves, except for such considerations as lack of time or inability to handle the child.

FOLLOWING THE CASE

Let us assume that the organization has been set up, that an adequate number of dentists are members, and that the attendant publicity has interested a parent. What happens next? The parent applies to the central office for enrolment. There the child is classified by age and the appropriate contract fee is determined. When the parent pays the fee, the contract permits her to select any dentist on the organization's list. The dentist does all the dental work required by the child, within definite limits. For example, extractions, fillings, x-ray examinations, prophylaxes, etc., would be definitely included; while orthodontia, major surgical procedures or the placing of space retainers or bridges would not be included.

When the work is finished, a copy of the

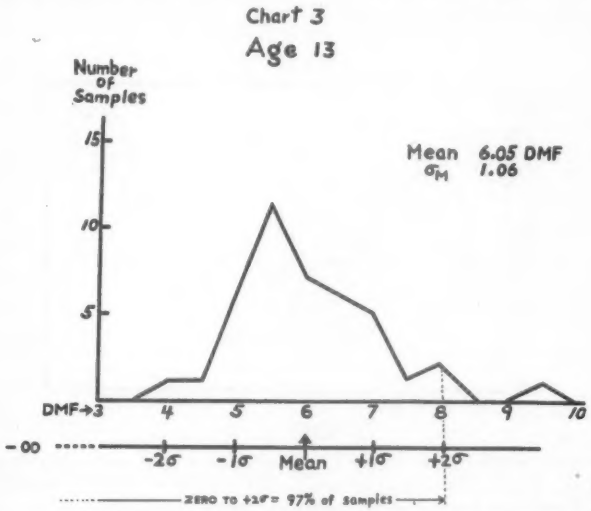


Fig. 3.—Frequency distribution of average DMF; thirty samples representing 27,655 white boys between ages of 12 and 14. (From Bull. 226 U. S. P. H. S., State of New Jersey.)

chart is sent to the central office, and the check for the fee is mailed immediately, less 10 per cent for administrative expenses.

The child is scheduled for supervisory examination and, when this is completed, a copy of the result is sent to the dentist as outlined above. The dentist recalls his patient at his convenience and at such intervals as he deems necessary, but at least twice a year. As each year's premium is paid, the dentist receives his fee, and the patient receives continuous attention.

FACTORS IN ESTIMATION OF THE FEE

Caries expectancy is the fundamental factor in the entire system. There are, as yet, no entirely satisfactory estimates of caries expectancy. Standards of measurement are rather flexible. The DMF (decayed, missing or filled) used by the United States Public Health Service is probably the most practical for the present purpose.[5]

The Bodecker Index is a finer degree of measurement. It is questionable whether it is necessary to refine the measurements for general statistical purposes. The measurement by FX (fillings or extractions) is applicable only to work performed (performance unit) and therefore quite useless as a diagnostic measurement. The DMF was used in the estimates which follow because it represents caries experience and is the most readily available information for analysis. It covers carious teeth plus missing teeth plus teeth filled.

The primary source for study material was taken from Bulletin 226,[6] a study of about a million and a half children in the United States between the ages of 6 and 14. This publication has been criticized in some quarters because:

1. Not all the examining dentists included pits and fissures in their examination.

CHART 4

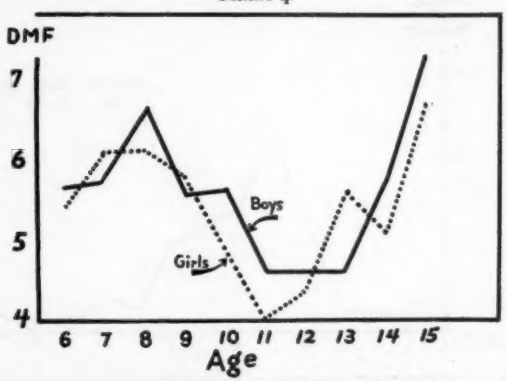


Fig. 4.—Average number of DMF (decayed, missing or filled teeth) per child at ages 6 to 15 among 4,416 school children of Hagerstown, Md. (From U. S. Pub. Health Rep., Vol. 53, No. 19, 1938; "Studies on Dental Caries" by Klein, Palmer and Knutson.)

2. The dentists who did the examining did so under conditions which would not enable them to find all the caries.

3. The dentists varied considerably in their proficiency.

None of these imperfections would invalidate the data, provided the deficiencies were recognized and accounted for. As for pits and fissures, only that portion of the report was accepted in which the examiners included pits and fissures to a large extent. It is certain that cavities were missed which could have been found by the x-rays, but it

does not seem improbable that the number was sufficient to introduce serious error. As for the proficiency of the examiners, it would be representative of any cross-section of the dental profession.[7]

Unfortunately, the actual frequency distributions of the individuals are not available from the Public Health Service at this time, but it was possible to use the averages as published for some measure of the expectation of caries.

The State of New Jersey was selected for study because it offered the nearest approach to the geographic, racial, industrial and economic conditions of New York City, and particularly because the examiners all used explorers and mirrors. Six of the nine examiners included pits and fissures as caries. A few of the communities (samples) were rural, but most of the samples were from urban areas.

In estimating the DMF (decayed, missing or filled), the following items were added together for each age group:

(a) *Present dental needs:*

Caries, deciduous teeth, number per hundred children.

Caries, permanent teeth, number per hundred children.

Extractions indicated, deciduous teeth, number per hundred children.

Extractions indicated, permanent teeth, number per hundred children.

(b) *Past dental needs:*

Filled deciduous teeth, number per hundred children.

Filled permanent teeth, number per hundred children.

Extracted permanent teeth, number per hundred children.

Beginning with page 125, column 309, seventy-three groups were selected in order, for the ages 6 to 8, using only white boys. For the other two groups, ages 9 to 12 and ages 13 to 15, thirty samples were selected at random, also white boys.

The age 6 to 8 group represented 39,664 children. The average number of decayed, missing or filled (DMF) teeth for the average age of 7 years was 5.05 per child, or 505 per hundred children.

At the mean age of 10, the average sample was 5.75 DMF, representing 33,339 white boys. At the mean age of 13,

TABLE 3.—NUMBER OF CARIOUS, FILLED AND MISSING TEETH AMONG 2,184 GIRLS OF HAGERSTOWN, MD.*

	Age									
	6	7	8	9	10	11	12	13	14	15
Number of children	156	206	256	240	259	269	297	278	185	58
Number of carious permanent teeth	41	151	254	386	419	462	644	799	569	231
Number of permanent teeth to be extracted	1	6	15	35	68	86	154	209	144	69
Number of carious deciduous teeth	728	1,013	1,158	751	501	226	119	44	7	0
Number of filled permanent teeth	10	22	65	127	219	272	364	463	225	85
Number of filled deciduous teeth	45	43	45	32	54	21	4	4	0	0
Total DMF	825	1,235	1,517	1,351	1,261	1,067	1,285	1,519	945	385
Average DMF per child	5.2	6.0	6.0	5.7	4.9	4.0	4.3	5.5	5.1	6.6

*Compiled from Klein, Palmer and Knutson (Footnote, Table 2).

the average was 6.05 DMF, representing 27,655 white boys. (Table 1.)

Plotting the frequency distributions of these samples (Figs. 1, 2 and 3) and laying out the standard error on the abscissa indicates where twice the standard error will fall. From minus infinity to this point will include 97 per cent of samples from such a population.[8, 9, 10] It is found that at age 7 (average), 97 per cent of samples are not likely to exceed 7 DMF.

Table 4.—Preparation of Arbitrary Fee Schedule for Child Enrolling at Age 7

Year of Service	New Caries Expected DMF	Annual Recurrent DMF	Total DMF	Annual Fee at $2 DMF	Adjusted Fee
1	5.0	3	8.0	$16	$16
2	2.0	3	5.0	10	12
3	1.2	3	4.2	8	10
4	0.8	3	3.8	8	9
5	0.5	3	3.5	7	8
6	0	3	3.0	6	7
7	0	3	3.0	6	6
8	0	3	3.0	6	6
9	0	3	3.0	6	6
10	0	3	3.0	6	6
		30	39.5	$79	$86

Table 5.—Arbitrary Adjusted Contract Schedule of Fees by Age on Enrolment

Age on Enrolment	Year of Contract 1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
3	$ 8	$ 6	$ 6	$ 6	$ 6	$6	$6	$6	$6	$6	$6	$6	$6	$6	$86
4	10	8	6	6	6	6	6	6	6	6	6	6	6		86
5	12	10	8	7	6	6	6	6	6	6	6	6			86
6	14	10	9	8	8	6	6	6	6	6	6				86
7	16	12	10	9	8	7	6	6	6	6					86
8	17	14	12	10	8	7	6	6	6						86
9	18	15	13	11	9	8	6	6							86
10	20	16	14	12	10	8	6								86

At the average age of 10, 97 per cent of samples are not likely to exceed 7.3 DMF. At the average age of 13, 97 per cent of samples are not likely to exceed 8.2 DMF.

These figures are averages and the conclusions must apply to averages as well. A complete frequency distribution of individuals would probably change the picture somewhat. The range would be longer and there would probably be a right skew distribution.

Institutions and dental clinic estimates are apt to be higher than the averages of the total population. The routine use of the x-rays would probably disclose more cavities and raise the DMF nearer its true value. However, it should be remembered that clinic patients are not very representative of the population. Patients are selected to a large extent by teachers, nurses and social service workers. This selection is made by looking into the mouth of a child, and, when the teeth are carious, the child is sent to the clinic. When lay people or even physicians see caries in a child's mouth, the teeth are liable to be in a pretty bad condition. The result is that clinics have highly biased samples.

Furthermore, clinic children come from the indigent and semi-indigent in the population. If diet does play an impor-

tant rôle in the formation of teeth, it seems probable that these children would be more susceptible to caries. There are as yet no conclusive proofs that this is so, but using only these children provides a biased sample, which is not representative of a homogeneous population.

All in all, while Bulletin 226 probably offers estimates a bit too low, clinic estimates are just as apt to be too high, and the true average will probably lie somewhere between the two. For the purposes of discussion, the estimates from Bulletin 226 will be used and our conclusions can be modified as we obtain more accurate data.

FEE PER HOUR

It has been estimated that a dentist works a total of 1,800 hours a year (300 days at six hours a day).[11] If he could utilize all his productive time at $4 an hour, his gross income would be $7,200 a year. In 1937, the average net income of dentists in the United States was $2,914. At its highest peak, in 1929, the average net was $4,273.[12]

Four dollars an hour is small compensation as measured by accepted standards, and it is not advocated that from now on dentists work for this rate of remuneration. It is clear, however, that dentists can work at this minimum rate

CHART 5

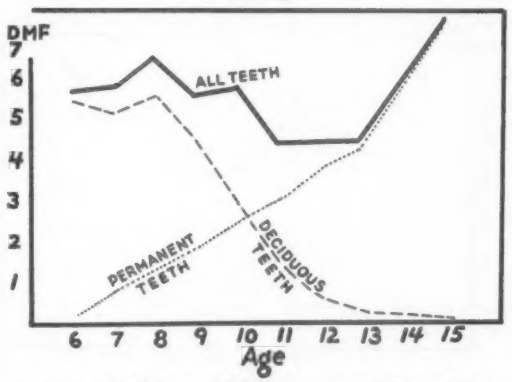


Fig. 5.—Average number of DMF per child between ages of 6 and 15 among 2,232 boys of Hagerstown, Md. (From U. S. Pub. Health Rep., Vol. 53, No. 19, 1938; "Studies on Dental Caries" by Klein, Palmer and Knutson.)

TIME REQUIRED PER DMF

With varying degrees of efficiency and differences of temperaments, there would be considerable variation in the time required by dentists to fill or extract a tooth. No measurements are available for private practice, but it is arbitrarily assumed that one-half hour is sufficient for the average filling, extraction or prophylaxis. This average time seems reasonable when one considers that a number of simple operations, such as extraction of loose deciduous teeth and the filling of simple pit cavities, are included in the estimate.

to financial advantage. The exact fee would depend on the locality (urban or rural) and the willingness of the dentists in the community to cooperate.

There are many reasons that a dentist should be willing to make concessions in the fee for a children's program. The plan would provide a steady income, with fewer wasted hours and no bad accounts. No "salesmanship" would be necessary to convince a mother that pits and fissures need filling. Adoption of the plan would result in a clientele showing more lifetime patients. Children in a practice serve as a means of introduction to the

adults of the family. The plan would assure a higher standard of children's dentistry than is now practiced.

There is no kind of education which can develop in the coming adult a better conception of the value of teeth than would regular, continuous visits to the dental chair as a child. School talks, toothbrush drills, hygiene lessons are all helpful, but they make little impression without experience. Instruction without experience is sterile, and if we would build the future market of dentistry, it is essential that children obtain dental experience from sympathetic dentists.

Another factor is our obligation to the community. The public, through the legislature, has given us a monopoly in the practice of dentistry. As long as we safeguard the interests of the public, we can expect to continue to hold this monopoly. If the public comes to the conclusion that we are utilizing this privilege to serve our own ends, and to its disadvantage, we may be faced with the danger of losing this monopoly. This is exactly what has happened in New Zealand, and adoption of its plan for meeting the situation is being advocated by some of our leading educators in the United States. If we can show that we are cognizant of our obligation to children and are willing to make some actual sacrifice, a step has been made in the direction of harmony.

FEE PER DMF

With the foregoing in mind, an arbitrary fee of $4 an hour and the ability to care for two DMF an hour, the fee per DMF is assumed to be $2. This will be called the arbitrary minimum fee per DMF.

ANNUAL RECURRENT DMF AND INCREMENT

Until now, we have considered only how much work a child would need upon the first visit if he had had no dental work done before. There would be, in addition to the average DMF, a certain amount of time required for such services as prophylaxis, bite-wing examination and other simple operations. This is estimated to be equal to the care of three DMF per year, and would be necessary every year regardless of any other needs.

The caries increment for each year following the first year of treatment is another variable which requires more statistical study. In a recently finished study of about 400 children (not yet

CHART 6

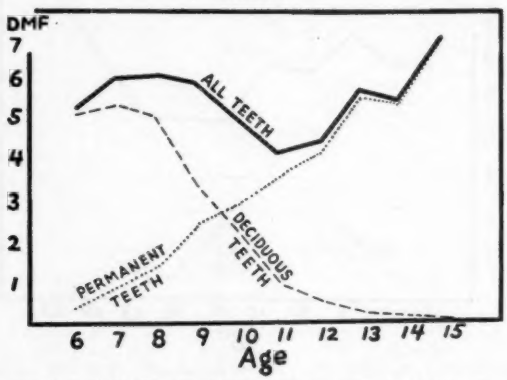


Fig. 6.—Average number of DMF per child between ages of 6 and 15 among 2,184 girls of Hagerstown, Md. (From U. S. Pub. Health Rep., Vol. 53, No. 19, 1938; "Studies on Dental Caries," by Klein, Palmer and Knutson.)

ready for publication), it was found that the increment was about 37 per cent of the DMF of the previous year in ages 5, 6 and 7. This included a considerable number of newly erupted first permanent molars with pits and fissures and a certain amount of therapeutic failure. Let us concede that there is apt to be an increment of 40 per cent each succeeding year.

An analysis of the Hagerstown study tends to show that the greatest increment would be expected between the ages of 6 and 9, to fall thereafter and to rise again between the ages of 12 and 15, in a haphazardly treated population. (Tables 2 and 3; Figs. 4, 5 and 6.) It is reasonable to suppose that with treatment (filling of teeth and extraction of those unsavable), there would be a considerable reduction, although there are no statistical studies available to prove it.

It will be noted from Figure 4 that, for both boys and girls, the average DMF is high at about the age of 8 years, falls with the loss of the deciduous teeth and rises again with the eruption of the bicuspids and second molars.

A comparison of the averages of this carefully supervised study at Hagerstown and the averages from Bulletin 226 shows that they probably come from similar "populations."

Combining the factors and applying them to the making of a rate schedule is simply a matter of arithmetic. At age 7, with a mean caries expectancy of 5 DMF and an addition of 3 DMF for the annual fixed service, the total fee would be based upon 8 DMF. If we accept $2 per DMF as an equitable fee, the premium should not be less than $16 for the first year at the age of 7.

After a year of good dental service at the age of 7, the amount of work required in the next year is not likely to be great. Figure 4 indicates that, after the age of 8, the caries incidence is apt to fall regardless of treatment. However, it is assumed that there is a constant caries increment equal to 40 per cent of the original 5 DMF. Forty per cent of 5 is 2 DMF, which, added to the annual recurring 3 DMF, makes a premium of $10. (Table 4.) This is continued until the minimum fee is arrived at.

The last column in Table 4 would be the adjusted rate, which, in this case, is modified to help maintain the basic contract. This minimum basic contract ought not to be less than the sum of all the premiums paid at the earliest age. Since it is not possible to go below $6 a year, and the youngest age at which a patient is accepted is 3, the basic minimum cannot be less than $84 (Table 5); that is, $6 for each of fourteen years. It will be noted, however, that the fee on enrolment at age 3 is adjusted to $8, rather than $6; making the total contract $86.

An attempt was made to adjust the schedule (Table 5) so that the total sums paid for an entrant would eventually be the same regardless of the entrance age. The contract with the patient is for the total amount, payable in annual installments according to such a fixed schedule.

Parents educated in the present philosophy of dental treatment may drop out after the first year. If the publicity (or education) is good, the parent will have been impressed with the importance of continuous treatment. The reduction in cost each year is itself an inducement, while the penalty for reentry would be a deterrent from dropping out.

If a parent realizes that he gains nothing by postponing treatment; that each year's delay penalizes the child with defective teeth, and that, in addition, the cost per year is higher, and particularly the cost of the first year, she is much more apt to get the child to the dentist at an early age. A little study of the schedule (Table 5) should convince the parent that it would be a matter of good business to maintain the payments.

If all these facts do not hold a patient,

the fee would still be enough to pay for the average patient at $2 per DMF.

It is assumed that we will draw a normally distributed group of children. The statistical probability is then that one-half the patients will have less than the average caries, while the other half will have more than the average.

If the fear among dentists persists that a majority of patients may show a high incidence of caries, the odds can be raised to any degree of risk which seems desirable. For example, from minus infinity to plus 2 standard deviations would take in about 97 per cent of cases,[10] so that (Chart 1) odds of about 97 to 3 would fall at 7 DMF. Raising the basis of caries expectancy (DMF) to 7 instead of 5 would give a 97 to 3 assurance that a patient would not have more work than he pays for. Similarly, any degree of risk can be established.

In an actual experience, it is probable that patients with caries are more apt to take advantage of the plan than those without caries. Eliminating a large number of zero DMF will tend to increase the average. What this average will be in experience, no one can foretell exactly. The first children enrolled might get bargain rates, but, within a few months, the statistical staff would have a solid basis for contracts. There is no reason that the contract base cannot be changed from time to time to conform with experience.

An important difference between this type of contract fee and the fee usually paid for a short series of treatments is that the dentist will receive more money and surer income, in the long run, from the contract. Each one of his child patients will spend $86 over a period of years. It is the rare child who spends that amount until the age of 16 under present methods of individual enterprise. It seems reasonable to suppose that if many thousands of children were to spend $86 each for dental care, the gross income of dentists would rise considerably.

The problem boils down to how to provide dental treatment for "three-thirds" of the child population. The outstanding need is accurate measurement of the needs. It would be well within the scope of some philanthropic organization to organize and pay for such a survey. There are no accurate data about caries expectancy (caries incidence) in New York City. What is the caries expectancy with treatment? What is it without treatment? What is the time required to perform a dental operation?

What minimum fee would be acceptable to the dentist? What facilities, both private and public, are available? How many dentists are willing to do dental work for children on a basis of an established contract fee?

The expenditure of funds for this purpose would be economy of the best kind. This information having been obtained and analyzed, a solid basis for planning can be established.

If, after analysis, the plan seemed practicable, it would be possible to include the indigent and semi-indigent children in a manner similar to the method employed by the Kellogg Foundation in Michigan. Social Security funds through grants in aid and public health funds would pay the premiums for these children. In those borderline cases in which a full premium could not be paid, the patient would be permitted to pay half and the balance would be made up from state funds.

If our object is to care for the "whole child," mentally and physically, this would have a salutary effect by removing the stigma and embarrassment of the free clinic. The dentist would be unable to differentiate between the children on relief and children paying their way. As a consequence, the child would receive the same consideration and treatment. The plan would further tend to put the dentist on his best, rather than his worst, professional behavior.

CONCLUSIONS

Unless dentistry is willing to chance the imposition of political direction of its policies, the profession must try to find a solution to the problem of dental needs, on the one hand, and idle dentists, on the other.

Children's dentistry, the nearest approach to preventive dentistry, lends itself most readily to measurement and group contract practice. Group contract practice is a logical step in the direction of efficient, large-scale dental treatment.

The suggestions outlined attempt to combine practical business methods with biostatistical technic, fitting them to the peculiar problems of dentistry for children. A flat contract premium by age is estimated, payable in decreasing annual installments in advance, until the age of 16. This makes the payments easy, provides continuous, rather than haphazard, treatment and should increase the gross income of the profession.

The plan is neither complete nor faultless, but it is submitted as a basis for discussion and research. The accumulation of more accurate information about caries expectancy, the average time required per DMF and the minimum fee acceptable to dentists is necessary before positive planning in this direction can be started.

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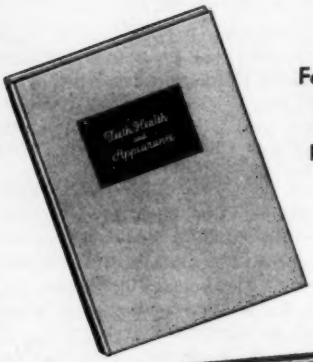

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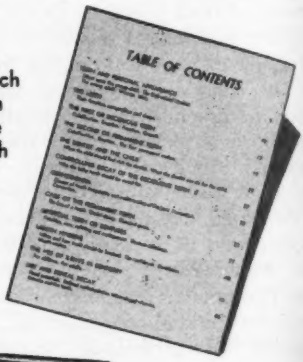

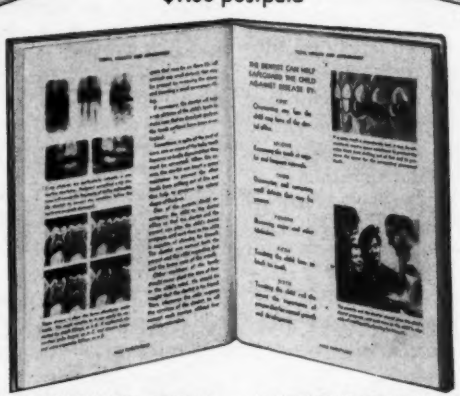

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DENTAL ECONOMICS

SUMMARY OF THE AMERICAN MEDICAL ASSOCIATION'S STUDY ON MEDICAL CARE

THE American Medical Association's study on medical care was conducted, for the most part, during 1938, by thirty-eight constituent state medical societies and 615 component county medical societies. Forms were prepared by the Bureau of Medical Economics for the use of these medical societies in the collection of data pertaining to the availability and utilization of existing medical, dental, hospital and allied services and facilities. The final report was published recently.[1]

The study, as stated in the preface to the final report, was to be ". . . a study of the demand and supply of medical care." The report continued: "The adequacy of the supply was not determined by statistical manipulation and interpretation of the returns in a central office, but was judged by the most competent agencies and individuals in each community that had first collected and analyzed the information upon which their judgments were based."

This study was not of the type that can be summarized by a statement of some of its major conclusions, since most of the information is contained in the opinions and recommendations expressed rather than in statistics. Furthermore, the need and supply of medical care are reported as they exist in each community and state, rather than on a nation-wide basis.

The report attempts to avoid any national generalization on the ground that such generalizations are usually false or misleading owing to the fact that different localities have widely varying needs and facilities. It does say:

A careful examination of the reported facts and opinions . . . seems to justify the conclusion that with the exception of isolated localities . . . there is no important section of the population of the United States that now fails to receive the medical care it needs and desires. Physicians everywhere have shown not only by their reports in this survey, but throughout many years that they have been willing to give service far beyond their obligations to the profession or as citizens to ensure that no one should be deprived of needed and desired medical care. Nurses, hospitals, schools, welfare workers and every other organization in touch with medical needs testified, in their reports, that there are few instances where it is impossible to secure needed and desired medical care.

Another general conclusion which is made is that this country has ". . . a fairly well correlated and constantly improving program of medical care." The report continues:

This program has not been planned in detail and then applied by authority, but has grown and developed with infinite diversity to correspond to an infinite variety of local and historical differences. . . . This program meets the practical, pragmatic test—it works. Measured by the statistical test that is applicable to any phase of medical care—that of morbidity and mortality—it has proved to be more efficient in attaining its purposes—to reduce illness and postpone death—than any of the autocratic and official programs existing in other countries and which are urged for adoption here.

In the part of the study entitled "Study

of Free Medical Services" is a section which presents a compilation of the information obtained from the 1,558 dentists who cooperated in the survey. These dentists were asked to keep a record form for one week during each of three periods selected to give a representative sample of services rendered during one year. These reports represented actual daily records kept by physicians and dentists. The information obtained from the dental records and as presented in the report was as follows:

Weekly reports were also received from 1,558 dentists in 28 states and Hawaii. The geographic distribution of the dentists who completed the records was similar to that of physicians. Therefore, these records were received from a fairly representative cross-section of the dentists in the United States. However, due [sic] to the fact that only one dentist in Hawaii submitted a report, these figures should not be considered representative of the dentists in Hawaii. According to the data supplied by 1,512 dentists the average number of years in practice was 17. A previous study[2] based on data collected from a larger sample of dentists in 1929 by the American Dental Association showed that, at that time, the dentists had been in practice for an average of only 15 years. It is apparent that the present data which gives [sic] an average of 17 years is [sic] weighted by dentists who have been in practice longer than the average; that is, fewer reports were received from dentists who recently entered practice. It is also possible that the average length of time in dental practice may have increased since 1929. Assuming that the data is [sic] based on reports from dentists who as a group have been in practice slightly longer than the average period, the figures obtained are still of value for this study if it is borne in mind that the conclusions do not apply to dentists who have just entered the practice of dentistry.

The average number of patients treated in a week by each dentist was 58, based on the information from 1,539 dentists who reported treating 88,886 patients in one week. The number of free patients, according to reports from 1,431 dentists who treated 8,880 patients without charges, was an average of 6 each week for each dentist. Weekly reports from 1,013 dentists indicated that 576 patients were referred to some sources of dental care, an average of approximately 1 person every 2 weeks per dentist. Only 651 dentists reported on the number of free surgical operations. These dentists performed a total of 2,436 free operations in one week or an average of approximately 4 free operations per week per dentist. The reporting dentists gave free services to approximately 10 per cent of the patients they treated during the year. This 10 per cent does not include the patients who received treatment with the understanding that they were to pay for the service but later failed to do so.

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WISCONSIN'S VOLUNTARY SICKNESS INSURANCE EXPERIMENTS*

THE State Medical Society of Wisconsin is conducting three voluntary sickness insurance plans as experiments in the delivery of medical care which should be of considerable interest to the dental profession. Two of them are for people of limited means and the third has no income restrictions, although it is expected to attract persons with incomes of $3,000 or less. These experiments are being carried out according to principles and procedures which are believed to encourage sound sickness care and to avoid a needless duplication in time, effort and money. Some of the more general of these procedures under which these trials are operating are as follows:

A. Patients will not receive a deliberately cheapened service during the course of the experiment, merely because of failure to fix a sufficient premium.

B. Free choice of physician is maintained among those ready and willing to serve to the end that the patient in his sickness needs have the service that his sickness requires, and not artificial limits of service or service for special needs at the hands of the inexperienced.

C. There must be no experimentation motivated by emphasis on profit to the physician. The effort must be to find new ways of serving the community.

D. There must be no duplication of an experiment which experience elsewhere has already demonstrated conclusively to be unsound in principle. There is no need to jeopardize the service to the sick man in order to duplicate an experiment wherein the unsatisfactory results of the exact method are already available and known. In this connection, it is to be recalled that under medical society supervision, there have already been more than 300 separate and different types of experimentation in the United States, the results of the initially most promising of which have been studied by the profession in Wisconsin.

E. The experiment in the delivery of medical service should have the same control as has the experiment in the field of finding new and useful drugs; i.e., it is not to be applied widely until its usefulness is demonstrated in at least a preliminary manner, and, conversely, the experiment involved is to be abandoned as soon as its non-usefulness is discovered.†

In approaching the problem of establishing criteria for judging the merits of the experiments, the medical society committee recognized the fact that few of the reports of the hundreds of trials and plans which have been conducted in the United States included any more information than a simple financial statement. To make certain that these experiments would not be similarly deficient, the committee outlined a number of questions to be answered upon the termination of the trial. These questions involved such problems as whether subscribers consulted physicians earlier than they had before becoming subscribers, were more willing to follow the advice of the physician or obtained a greater degree of preventive service; whether such plans could operate economically from the point of view of administrative costs, and whether the plan discouraged self-medication.

The society also made careful preparations for the establishment of proper contractual relationships, and all of the legal documents were carefully and thoroughly prepared. The object in putting special emphasis on the legal aspect of these plans was to minimize all possible

*Summary prepared by the Committee on Economics of the American Dental Association.

†Preliminary Report of the Advisory Committee on Voluntary Sickness Insurance to the 1939 Session of the House of Delegates, State Medical Society of Wisconsin, p. 1.

misunderstandings that might arise if the documents were carelessly worded.

Upon this sound basis, three experimental plans have been developed, two of which are already in operation. Each is to continue for one year after it becomes "service operative"; that is, after the people are eligible to receive treatment under the plan. The plan may be extended indefinitely after this trial period if there is sufficient indication of success and a desire to continue it.

A plan was first put into operation in Douglas County, which is in the northwest corner of the state and includes the City of Superior, the fifth largest city in the state. In and around the vicinity of Superior are a number of the oldest and most successful cooperative associations in this country. One of these has a yearly gross income of approximately $3,500,000. It is not strange that the first to take advantage of the medical societies' offer to assist in formulating voluntary sickness plans were the members of a cooperative association. This group came to the medical society with a tentative proposal and asked its cooperation and assistance in working out a plan.

After a number of conferences, an agreement providing for the establishment of a trial plan was consummated, and 72 per cent of the members of the county medical society indicated a desire to participate. Shortly thereafter, a full-time lay manager was employed and solicitation of subscribers was begun. These were developments of the fall of 1938 and winter of 1939.

The active management of the plan agreed upon is supervised by a board of directors who represent the several cooperative societies constituting the association. There are no requisites for membership except payment of fees and acceptability of the applicant on the basis of health conditions.

All applicants must submit to a physical examination and may be accepted, rejected or accepted with limitations. For example, the board might accept an individual for all treatment except for hernia. If the condition is removed, the subscriber may be approved unconditionally. Such limitations are imposed on subscribers in order to protect the association from an influx of ill persons. When there is individual rather than group acceptance, as in this plan, some safeguards must be adopted.

The decision as to acceptance or refusal, which rests solely with the board of directors, is based on the report of the physical examination. Each applicant is anonymous, the board considering only the examining physician's report in determining acceptability. During the first six months of operation, no applicants were rejected, although a few were accepted with limitations.

After his acceptance, the subscriber is entitled to complete professional care without limitation for a sum of $2.90 a month for a family, $2.25 for a married couple and $1.50 for a single person.

Payments to the physicians are made each month on the basis of not less than 35 or more than 50 per cent of the normal schedule of fees adopted by the Douglas County Medical Society as a "guide" for their members in submitting statements to the association for payment. At the end of each three-month period, any surplus of funds is prorated among the physicians in accordance with the amount of service each has rendered under the plan.

The plan was placed in operation July 1, 1939, although it was still a few members short of the number agreed upon (150) as a minimum before beginning service. It was necessary to begin service in order to retain the existing members and prevent collapse of the plan. The plan has now been in operation for more than five and a half months and 163 members have been enrolled. The state medical society has contributed to the administrative overhead during the formative period of the plan because the

20 per cent of the fees that was earmarked for administrative expenses has not proved sufficient. The 80 per cent earmarked for medical service during the first five months would have paid out approximately 97 per cent on the dollar (on the basis of a normal schedule of fees). This condition will probably not continue, however, because there were no major services in the first five months, and there have been some since that time. It is expected that the normal payments will be between 75 and 80 per cent of the average fee schedule.

The second trial plan, in Milwaukee County, differs from the first in a number of ways. This plan is intended to provide care for all persons within a specific income range and a restricted geographic area. The Douglas County trial differs from this in that it has no income limitations and any one in the county can become a subscriber.

In 1935, the Rural Resettlement Administration constructed, just west of Milwaukee, an entire community, called Greendale. Its purpose is to provide low-cost housing for persons with incomes ranging from $1,000 to $2,400, and it includes more than 572 dwelling units costing more than $10,000,000.

The invitation to establish a sickness insurance program for Greendale residents emanated from the management of the Greendale project. After considerable planning and negotiation, an agreement was entered into with the Milwaukee County Medical Society, and this became the second of the experimental plans of the state medical society.

The sum of $1.50 a month per family, $1 for a couple and $0.50 for a single person, entitles the subscriber to complete medical service after he has paid for service up to $24 in any one year. In other words, the subscriber pays the foregoing fees and up to $24 for medical care, but, after that, the service costs him nothing. The intent of this plan is to provide protection against so-called "catastrophic illness." Persons in these income groups are believed to be able to stand an expense of $24 a year, but any sums in excess of this soon become a hardship. For $18 a year, a family is protected against this unusual expense.

In contrast to the Douglas County plan, there is no physical examination of subscribers, and any resident of Greendale is entitled to join. The only limitation in this respect is that the plan shall not begin to operate until 33⅓ per cent of the residents of Greendale have agreed to participate. This is to insure financial success as well as a sufficiently large number of participants to provide a normal risk. The minimum number of subscribers was reached last November. A community volunteer group conducted an intensive solicitation campaign and 201 subscribers were obtained.

Subscribers are free to choose from more than 400 medical society members who have agreed to participate in the trial and to serve on the panel. Physicians will be paid not less than 50 per cent of their charges to the subscribers at the end of every three-month period. If there are funds in excess of this percentage, they will be accumulated until the end of the trial period, and then the physicians will be paid the balance of their accounts or whatever portion the funds are sufficient for.

Subscribers who wish to obtain benefits under the trial plan must obtain their original medical care from one of the participating physicians. The subscriber must pay to the participating physician $24, in addition to the premiums which he pays to the Medical Society of Milwaukee County. The $24 must actually be paid to the physician before the subscriber can obtain benefits under the plan.

The third trial plan was developed under the initiative of the Rock County Medical Society. This county is located in the south central part of the state and includes the cities of Janesville and

Beloit. This plan is necessarily different from the others because of the condition imposed by the state medical society; namely, that there shall be no duplication of effort.

Therefore, this plan enlists subscribers on a group selection basis. Participation is limited to groups who are (1) employed and (2) bound together as a group for other than health purposes. At least 50 per cent of the group must subscribe, with a minimum of ten subscribers. This group membership percentage must be constantly maintained. Groups may come from anywhere in the county.

Individuals will be accepted without physical examinations, but a member may be rejected either unqualifiedly or temporarily as a "poor risk." This privilege of rejecting applicants is introduced to eliminate the necessity for a higher percentage of group participation, the purpose of which is to obtain a true cross-section of the population.

Subscribers are to pay $3 a month per family, $2 a month per couple and $1.50 a month per single person. The responsibility for the collection rests upon the employer or group representative.

The direction of the plan is to be under the control of a committee of the medical society. As in other plans, 20 per cent of receipts has been earmarked for administrative purposes and 80 per cent set aside for payments to physicians for services rendered under the plan. This trial has been approved by the medical society only recently and has not reached the operative stage.

The society has made several approaches and announced the availability of the trial plan to many groups, but, to date, no one has indicated a desire to come under the plan. A few families have made application for participation, but the plan cannot begin operation until there have been 150 families enrolled. It appears that some intensive solicitation work is necessary in order to interest groups and families. There is seldom enough individual interest to insure the success of such plans.

The efforts of the Wisconsin Medical Society to make a useful, well-controlled experiment in this field, appear to be unique. If the work continues on the same high grade, the experiences of these plans should be worth watching. Other states, such as California and Michigan, have entered upon similar programs under medical society sponsorship, but they do not appear to have considered the question so thoroughly or approached it so scientifically.

Most of the plans in other states, as well as the Rock County plan in Wisconsin, are quite similar in outline to many hospital insurance plans that have been instituted in the last few years. It will be interesting to see whether the same method of organization will be so successful when applied to medical care.

The plans in Douglas and Milwaukee counties are relatively unique, at least in this country. No matter how they work out, they will provide valuable information for future activities in the field of voluntary sickness insurance. It will be particularly interesting to see whether they will have more or less success than the plans patterned after the hospital insurance schemes.

A number of individuals and committees in various parts of the country have been attempting to devise practicable plans for voluntary dental care insurance, either on an independent basis or in conjunction with some medical society plan. Should attempts be made to place any of these plans in operation, the experiences of the voluntary medical insurance plans will be of great value.

CURRENT LITERATURE

Quinine Dermatitis from Anacin

By J. Lamb

Two instances of dermatitis medicamentosa following the use of anacin are presented. It was demonstrated in each case that the offending drug was quinine, which anacin contains. In attempting to find the cause of unexplained dermatitis medicamentosa, the physician should remember that anacin is rather widely used as an anodyne. —*Arch. Derm. & Syph.*, 40:803, November 1939.

B. P. Kearney.

Fermentation of Sugar Acids

By G. Robbin and K. Lewis

The fermentation of twelve sugar acids was studied with respect to thirty-two strains of bacteria belonging to eleven genera. Comparison of the aldoses, alcohols and aldonic acids in the glucose, mannose and galactose series supports the conclusion of previous workers that the aldoses are more readily fermented than either the alcohols or the acids. The results indicate that further investigation may lead to data of value for differentiation of closely related bacteria.—*J. Bact.*, 38:484, 1939.

M. Van Kesteren.

Oral Manifestations of Tuberculosis

By K. Fulton

Unlike many other diseases, oral lesions in tuberculosis are usually secondary symptoms, never occurring until the disease has reached an advanced stage. The only primary lesions found in the mouth are located on the tonsillar crypts. In acute miliary tuberculosis of the pharynx, lesions are found in the oral cavity located on the lips, cheeks, gingiva, hard and soft palate, tongue and alveolar process. Tuberculous lesions in the jaws are rare, but when they do occur are located at the orbital margin of the superior maxilla or at its junction with the malar bone. Tuberculosis orificialis affects the tongue and lips, but is secondary to an advanced pulmonary tuberculosis. It is usually caused by contact of the tubercle bacillus with the skin or mucous membranes traumatized by jagged teeth, or follows extractions. The early ulcer is superficial and irregular and has a slightly undermined border. It is painful, spreads rapidly and shows no tendency to heal.

To the dentist, however, mouth lesions in this disease are relatively unimportant, since they do not occur early enough to have diagnostic value. Treatment of the lesions is palliative. Every effort should be made to keep the mouth clean by prophylaxis, insertion of fillings and replacement of defective restorations.—*Mil. Surgeon*, 85:399, 1939.

S. B. Finn.

Oxalic Acid in Foods and Its Behavior and Fate in the Diet

By E. Kohman

The author has analyzed ninety-four different fruits and vegetables for total percentage of solids, oxalic acid and calcium. Only a few of the vegetables analyzed had a high oxalate content, among them being spinach (the greatest), containing 10 per cent of the total solids. Controlled experiments were carried on, using the rat, with basal diets supplemented by several substances, including calcium carbonate, calcium oxalate, spinach (high in oxalate) and turnip greens (low in oxalate).

The calcium and oxalate in the urine and feces were determined, in addition to the calcium and oxalate in the food consumed and the calcium deposited in the tissues.

If to a diet relatively low in calcium, but permitting good, although not maximum, growth and bone formation, spinach was added, a high percentage of deaths occurred. Reproduction was impossible. The bones were extremely low in calcium and very soft and pliable. Tooth structure was disorganized and dentin poorly calcified. Spinach not only supplies no available calcium, but renders unavailable a considerable amount of that of other foods. A con-

siderable amount of oxalate appears in the urine, and much more in the feces (along with calcium). Four tables and one photomicrograph are presented, the latter of the dentin of rats' teeth, showing hypocalcification of the dentin on the diets supplemented with spinach as compared with that on the basal diet and that supplemented with turnip greens.—*J. Nutrition,* 18:233, September 1939.

NORMAN S. SIMMONS.

Effect of High Calcium and Phosphorus Intake on the Calcium and Phosphorus Balance

By J. HALDI, G. BACHMANN, W. WYNN and C. ENSOR

WHEN large amounts of calcium and phosphorus were added to the diet of albino rats, all the excess calcium was recovered in the feces, while the phosphorus in the feces was considerably less than the excess intake. The kidneys excreted little more calcium, but much more phosphorus, than on the control diet. A small portion of the excess absorbed calcium, but none of the phosphorus was stored in the body. The percentage gain in body weight was not affected by the high calcium-phosphate intake; the dry weight was considerably lower, and the fat content of the body was significantly reduced. The large amount of calcium and phosphorus present interfered to a slight extent with the absorption of food material, as shown by examination of the feces.—*J. Nutrition,* 18:399, October 1939.

NORMAN S. SIMMONS.

The Relation of Vitamin C Deficiency to Nutritional Anemia

By H. ARON

GUINEA-PIGS fed a scorbutogenic diet supplemented with ascorbic acid for a period longer than the life cycle of the erythrocyte showed normal blood formation. However, when the ascorbic acid supplement is withdrawn, the hemoglobin content of the blood is reduced within twenty days. Addition of iron to the diet does not prevent this decline. The anemic animals can be cured by the administration of ascorbic acid in large amounts, orally or subcutaneously, provided they have not lost more than 25 per cent of the body weight or one-third of the hemoglobin. The rise in hemoglobin takes place much more rapidly than the rise in body weight.

While these experiments give unquestionable evidence that ascorbic acid is a factor in hemoglobin production in guinea-pigs, there is no proof that it is the only factor present in the vegetables used in the experiment.—*J. Nutrition,* 18:375, October 1939.

NORMAN S. SIMMONS.

Oral Foci of Infection as Related to Diseases of the Kidney

By C. CANBY

KIDNEY lesions may be classified as (1) non-infectious (glomerular nephritis), produced by extrarenal bacterial toxins, frequently from acute diseases of the upper respiratory tract acting upon the kidneys by way of the blood stream; and those caused (2) by direct invasion of the organisms. Of most importance to the dentist is the focal group of infections, as teeth and surrounding tissues are often the source of the infection. This group consists mainly of the staphylococci and streptococci, which enter the kidney by way of the blood stream. The virulence of these oral organisms is usually so low that, by the time they have caused the systemic condition, removal of the dental infection often does not result in improvement. For this reason, the major rôle of foci of infection is frequently forgotten. The organisms isolated from the kidney lesions are the same morphologically, culturally and biochemically as those found in dental infections. Experimental production of kidney lesions by injection of mouth organisms has been demonstrated by many investigators. The rôle of chronic areas of infection in the mouth in the production of other body lesions must never be overlooked.—*Mil. Surgeon,* 85:374, 1939.

S. B. FINN.

Legal Aspects of Radiodontics

By A. SWEET

THE increasing use of dental roentgenograms has made them legally important in malpractice cases. Among the facts to be remembered by the dentist are:

1. As a witness in court, he may expect to be asked such questions as the following: (a) What is your training and experience in radiodontics? (b) At what time and

place did you take the roentgenograms? (c) By what means do you identify roentgenograms? (d) Have the roentgenograms been in your possession continuously? (e) What were the exposure data employed in making them?

2. Courts have ruled repeatedly that the roentgenograms are the property of the dentist making them, except in "referred" cases.

3. The failure to make roentgenograms is coming to be looked upon as negligent malpractice by the courts (Roberts *v.* Parker, Calif., 8P, 2cf, 908).

Both preoperative and postoperative roentgenograms have been held necessary. If the patient refuses to have them made, record should be made of such refusal.—*Am. J. M. Jurisprudence,* 2:323, 1939.

MARTIN DEAKINS.

Dental Cooperation in Diabetes Mellitus

By S. BLAUSTEIN AND C. FERGUSON

A GROUP of 125 patients with diabetes mellitus were treated and 252 teeth were extracted. This included single and multiple extractions as well as cyst removal. It was found that the percentage of bleeding has no relation to the severity of the diabetes when calculated on the basis of insulin dosage, or to the blood sugar level at the time of operation. The dental interference did not cause any significant change in the level of the blood sugar when the operation was concluded within two hours after breakfast and insulin. The percentage of postoperative sequelae was no higher than normal. No significant difference in effect on the diabetic patient was observed following the use of three different types of local anesthetic solutions. General anesthesia is contraindicated owing to its tendency to cause vomiting, which may seriously interfere with the diabetic nutrition.—*J. Lab. & Clin. Med.,* 25:47, October 1939.

B. P. KEARNEY.

Treatment of Malar and Zygomatic Fractures

By F. RICHISON

THE number of facial fractures is rapidly increasing, owing to accidents resulting from the excessive speed of our transportation systems. Malar and zygomatic fractures should be treated as soon as possible, to facilitate reduction and to assure esthetic results. Examination of these fractures is best done with the patient in a semiprone position, with the examiner standing behind, comparing the right and the left side of face digitally and visually. Roentgenographic confirmation of all findings should be routine.

There are many methods in use for reduction of these disfigurations. Preference is given the hook method used extra-orally, rather than to intra-oral methods, thus avoiding the contamination of the field by oral secretions.

Because of complications, fractures in this area should be handled in consultation with the surgeon, roentgenologist, rhinologist and prosthodontist.—*U. S. Naval M. Bull.,* 37:566, 1939.

ARTHUR F. FISHER.

Dead Teeth and the Antrum of Highmore

By J. NOVITZKY

ANTRAL involvement as a result of direct extension from an infected suppurating tooth root can best be treated by the dental surgeon, working in collaboration with the rhinologist.

In the acute diffuse type of infection, operative interference should be most conservative, limited to establishing free drainage until the process is localized. Moist heat applications have been found valuable in maintaining circulation of the blood. Careful surgical dissection under direct vision in a field unobscured by blood, and the removal of all postoperative débris, are essential to success.—*Am. J. Surg.,* 46:570, August 1939.

B. P. KEARNEY.

Mixed Tumors of the Salivary Gland Type Seen in the Pharynx

By C. Fox

MIXED tumors of the salivary gland type are sometimes entirely separated from the glands. They probably originate from embryonic cells that become separated from the body of the gland. They contain tissue derived from both the ectoderm and the mesoderm. They are benign and can occur at any age. The growths are firm, slightly nodular and completely encapsulated, and cause little discomfort. Their appearance and behavior are so distinctive that biopsy is unnecessary as an aid to diagnosis. It is,

in fact, contraindicated because it complicates subsequent removal of the tumor. Care must be taken, during the removal, to preserve the continuity of the capsule. If it is ruptured, a piece of tumor tissue may be left behind and would probably cause a recurrence of the growth.—*Arch. Otolaryng.*, 30:73, 1939.

B. P. KEARNEY.

Studies on Lactobacilli. I. Fermentation Reactions of Strains Isolated from Human Mouths

By R. HARRISON

THREE strains of the lactobacillus were isolated from saliva and bacterial plaques. The three morphologic groups were divided into two main groups on the basis of activity in litmus milk. Action on mannitol, sorbitol, raffinose and dextrin was used to further divide the main groups into nine subgroups. Morphology and fermentation reactions showed little correlation. Since the clinical records were not known, the possible significance of the strains in caries could not be considered.—*J. Infect. Dis.*, 65:142, September-October 1939.

H. TEFFT.

Intraoral Minor Salivary Gland Adenocarcinoma

By J. WIRTH

IN an attempt to stress the need of recognition of intra-oral minor salivary gland adenocarcinoma as a clinical entity, six cases are presented and analyzed in comparison with other reported cases. Age, sex, duration of symptoms and site of tumor are variable. Differential diagnosis from other neoplasms is often difficult.—*Am. J. Roentgenol.*, 42:508, 1939.

ARTHUR F. FISHER.

Stomatitis of Dietary Origin

By W. R. AYKROYD, B. G. KRISHNAN and R. PASSMORE

INVESTIGATION was undertaken on patients living on a diet of parboiled milled rice, with very limited quantities of pulse, vegetables and fruit and no milk or flesh food. Some of these patients developed, besides stomatitis, excoriation and desquamation of the mucocutaneous junctions of the anus, vagina and prepuce. In all, twenty-four cases were treated with varying doses of nicotinic acid.

The results showed nine completely cured, seven definitely improved and eight showing no improvement at all. The lack of satisfactory response in some of these cases may be due to a deficiency of other factors in the vitamin B_2 complex or to a deficiency of other vitamins. The authors believe that the stomatitis and accompanying lesions of the mucocutaneous junctions and skin do not appear to be initial signs of true pellagra.—*Lancet*, 2:825, 1939.

B. P. KEARNEY.

De L'Inactivation du Principe Bacteriolytique des Actinomyces par les Rayons Ultra-Violets

By M. WELSCH

LIKE numerous micro-organisms, viruses, bacteriophages, enzymes and toxins, the bacteriolytic principle of *Actinomyces* is sensitive to ultraviolet rays of short wave length. Various effects, including those of the length of exposure of the material, the initial concentration, distance from the source of light, variations in pH and the use of different types of culture media, were studied. It was concluded that the real sensitiveness of the lytic principle could not be studied until it was obtained in the pure state.—*Soc. Biol. Compt. Rend.*, 22:1296, 1939.

MARY VAN KESTEREN.

Effect of Fluorides on Salivary Amylase

By F. MCCLURE

IN buffered solutions, concentrations of fluorides (NaF, KF, NH_4F and Na_2SiF_6) varying from 1.7 to 8,550 parts per million of fluorine present in 1 to 10 dilutions of saliva were found to have no effect on the activity of salivary amylase. The same fluorides, when present in the enzyme substrate mixture during the digestion period in concentrations from 0.76 to 760 parts per million of fluorine, had no effect on enzyme activity. School children receiving 1.8 parts per million of fluorine in drinking water showed no difference in amylolytic activity from school children not receiving fluorine in drinking water.

The optimum pH for salivary amylase in the presence of chloride activation is about 6.7. Any significant change in amylolytic activity produced by fluorides is probably

the result of a change in pH. A change in pH to 6.0 or 7.5 may inhibit amylase activity as much as 25 per cent.—*U. S. Pub. Health Rep.*, 54:2165, December 1939.

S. B. Finn.

Scope and Utility of Vinethene Anesthesia in Dentistry and Oral Surgery

By S. Cartin

Vinyl ether is a valuable substitute for ethyl ether, nitrous oxide-oxygen or ethyl chloride in dental operations requiring only a few minutes. The open drop method of administration is employed, with a half hour as the limit of the anesthetic duration.

Vinyl ether is closely related to ethyl ether in its chemical and physical properties. It is explosive and very volatile, decomposes in the presence of light and, once opened, must be used within twenty-four hours.

It is non-cumulative, less irritating to the mucous membranes, undergoes no chemical changes in the body and is easily eliminated, and the surgical anesthetic stage is reached within one to two minutes.—*Cur. Res. Anesth. and Analg.*, 18:324, November-December, 1939.

W. J. Manion.

Fractures and Dislocations of the Jaws and Wounds

By D. H. Bellinger

The Barton bandage, as commonly applied as a temporary means of treating mandibular fractures, is inefficient and only causes more displacement. In fractures of the mandible, intermaxillary fixation is the method of treatment where possible. Reduction and fixation have been greatly simplified by the use of intermaxillary rubber band traction. In clinics, this method has largely supplanted all other methods, especially if a sufficient number of teeth are present in both jaws. It entails nothing more than attachment of small aluminum shells to the teeth of the upper and lower jaws with 25-gage stainless steel wire and attaching the rubber bands between the opposing shells of the upper and the lower teeth.

The great majority of mandibular fractures are compounded into the mouth, in consequence of which they are liable to infection. Some advocate drainage at the time of reduction of the fracture. Since less than one-half of such cases become infected, it would seem conservative to treat the infection by localizing and draining the abscess with an extra-oral incision at the most dependent point of the swelling.

Fracture and dislocation of the jaws are frequently accompanied by wounds and lacerations. For minimal facial disfigurement, the repair of soft tissue wounds of the face demands thorough initial care.—*Am. J. Surg.*, 46:535, 1939.

Arthur F. Fisher.

Dietary Effects Upon the Acid Neutralizing Power of the Saliva

By J. H. Wills and J. C. Forbes

Acid neutralizing power was determined by titrating 3 cc. of saliva to the methyl red end-point with 0.01 normal hydrochloric acid. Stimulation of the salivary glands by chewing various materials was found to give quite inconstant results. Accordingly, all samples used in the work were of basal saliva. It was found that when the subjects were placed on a diet high in protein and 5 per cent vegetables, the acid-neutralizing power of the saliva was significantly higher than when the same persons were on a diet low in protein and 5 per cent vegetables and high in carbohydrates. In general, a single carbohydrate meal caused a marked fall in acid-neutralizing power, while a single protein meal caused a rise. Evidence is advanced that these effects are systemic rather than local in origin.—*J. D. Res.*, 18:409, October 1939.

B. P. Kearney.

A Description of the Salivary Glands of the Rat and a Procedure for Their Extirpation

By Virgil D. Cheyne

A three-stage operating technic is performed for the complete removal of the major salivary glands. The procedure is essentially that used by others concerned in the study of experimental pathology by the surgical extirpation of organs. Altering the technic, a process of selective gland removal can be effected, which will result in a partial xerostomia of almost wholly mucous or serous character as desired. Comparative studies of operative physiology, bacterial

findings, enzymatic action, type of secretion and histologic material have indicated the similarity of this animal to the human. It is an excellent laboratory animal and it is omnivorous.

It is suggested that this method offers a valuable means for study of function of the salivary glands in their relation to the problems of dental caries, oral pathology or metabolic activities of the body in general. By the use of this operative procedure, the rôle of the function of saliva itself can be more adequately investigated.—*J. D. Res.*, 18:457, October 1939.

B. P. KEARNEY.

Preferential Mottling of the Enamel of Rat Molars

By S. F. DIXON and G. J. COX

IN confirmation of inhibition of dental caries in rats by the administration of fluorides, the authors fed two groups of rats, numbering twenty-two and twenty-three, a caries-producing ration of corn meal 66, whole milk powder 30, alfalfa meal 3 and sodium chloride 1. One group had 250 parts per million of sodium fluoride in the feed. On examination of the teeth before they were sectioned, it was found that the enamel of the third molars of nineteen of twenty-two rats that had received additional fluorine showed a faint diffuse milkiness. None of the first or second molars was affected. No milkiness was observed in any teeth of the control rats.

This discovery of mottled enamel in the third molars of rats makes it possible to produce preferential decay in a rat's mouth if the protective action of fluorine is exerted by such late inclusion in the diet; or, on the other hand, failure to prevent caries in the third molar would indicate that fluorine exerts its protective action earlier in the life of the tooth.—*Proc. Soc. Exper. Biol. & Med.*, 42:236, 1939.

VIRGIL D. CHEYNE.

"Tongue-Tie" in Infants

THERE is a clinical entity "tongue-tie" in infants and moderate degrees of it are not especially rare. The frenum may be so short as to be almost absent or the membranous portion of the frenum may extend or be inserted so far forward that the tongue cannot be raised or protruded normally. The tongue may be slightly bifid as a result. "Tongue-tie" never causes difficulty in nursing, presents little interference, if at all, with articulation and never causes delayed speech. Unless "tongue-tie" is serious, it rarely requires treatment. Moderate gradations in which the tongue can be protruded to the external margin of the lips may safely be let alone as elongation of the frenum occurs as the infant grows. Extreme cases can be remedied by the simple procedure of raising the tip of the tongue and cutting through the filmlike frenum, care being taken not to cut the vessels.—Queries and Minor Notes, *J.A.M.A.*, 114:80, January 6, 1940.

M. K. HINE.

Experimentelle Untersuchungen Ueber Gelenktransformationen bei Verwendung der Methoden der Funktionskieferorthopaedie (Experimental Studies of Transformations in the Mandibular Joint by the Use of Functional Orthopedics of the Jaw)

By K. HÄUPL and R. PSAUSKY

THIS is one of several experiments carried out in order to study the tissue reactions following the functional orthopedics of the jaw according to the principles of loose appliances ("activators"). A full grown monkey (Pavian) was treated eleven weeks from one and one-half to two hours a day. The insertion of the activator in the beginning of the experiment was made under slight narcosis. With the activator in position, a jumping of the bite was produced. At the completion of the experiment, the tissue changes of the mandibular joint which had been caused by the treatment were studied. Apposition of bone was found especially on the distal part of the condylus head, and, furthermore, new formation of bone was observed on the mesial side of the posterior borderline of the joint. These formations were due to the changes in the muscle function in the joint and ramus mandibularis, and they represent the first stage in the process of transformation. The changes produced are considered clinically favorable for the treatment of distal occlusion.—*Deutsche Zahn-, Mund- u. Kieferheilk.*, 6:439, 1939.

R. F. SOGNNAES.

INCIDENTS OF PRACTICE

Fused Cuspid and Bicuspid

By Irving S. Vogel, D.D.S., Helmuth, N. Y.

Patient presented himself for extraction of seven remaining pyorrheic lower teeth. Mandibular block anesthesia was given. In the process of extracting the lower right first bicuspid, it was noted that the cuspid responded to the same movements as the bi-

Fused teeth.

cuspid. The teeth were removed together. The sockets were continuous, no septum being present. Healing was uneventful. The accompanying x-ray film shows that the teeth were fused over almost the entire root length.

Gowanda State Hospital.

A Simple Method of Restoring Relationship in Warped Partial Dentures

By Howard C. Sigtenhorst, D.D.S., Chicago, Ill.

Every dentist, at one time or another, has had the experience of attempting to adjust an all-metal partial denture that has "sprung." No amount of bending seems to correct the relationship and such interference usually makes the condition worse.

I have devised a procedure that corrects most of these cases, and as I have never seen a similar technic in the literature, I am presenting it here.

An impression of the arch is taken with any of the hydrocolloid materials and a cast is made of any strong heat-resisting die material. The porcelain teeth are removed from the partial denture by boiling in acid and the case is put on the model as well as possible considering its warped condition. It is then heated by a brush flame of a blow torch and, when thoroughly heated, is pressed into correct relation with a small instrument. When it is in proper adaptation, the heat is gradually withdrawn to restore the temper.

The idea is to apply the heat to the proper place on the partial denture to overcome the "rock." Usually, only one part of the partial denture is at fault, and a little study of the nature of the warped condition before the heat is applied will indicate just where the treatment should be applied.

Many partial dentures that would otherwise require recasting can be thus restored to useful service.

Dangers in Treating Vincent's Infection by the Spray Method

By L. G. Barrett, D.M.D., Hanover, N. H.

Vincent's infection has interested me as a community problem and also as an individual danger, since 1923. The observation and treatment of several hundred cases have taught me to give very careful attention to this condition, which is taken altogether too lightly as a comparatively harmless and socially accepted embarrassment. Ceremonial weekend events in college towns are followed by small epidemics of this disturbance. Student nurses in hospitals of excellent reputation and carrying dental consultants on the staff frequently have this infection and the fact is completely disregarded. A young

mother died of respiratory involvement following ether anesthesia, because of the presence of Vincent's organisms, after she had disregarded advice to postpone tonsillectomy until these organisms were eliminated.

These observations and many others compel me to believe that as members of a profession, we have here a public responsibility which we cannot afford to longer disregard. It appears that our knowledge of this disease is considerable and is entirely adequate to care for the cases, once recognized. The only detail of treatment which it seems necessary to comment upon is the danger of careless use of a spray during early care of the case.

Recently, my assistant held a slide 10 inches before and slightly above the mouth that I was treating. It was the patient's second visit. Some repair had taken place and some of the lesions were quite active. The spray was being used for the purpose of mechanically washing away obvious masses of sloughed interdigital gingival apices, etc. The solution was a warm saline. Smears from several of the lesions were taken at the time. These were stained with carbol-fuchsin and observed as follows: The smears direct from the lesions showed large numbers of tissue cells and moderate numbers of both the fusiform bacilli and the spirilla. The slide made from less than five seconds exposure to accidental mist, backdrifting from the spray being directed on these small lesions, exhibited a great many circular spots six or eight times the size of the high power field. Each of these spots revealed a very evenly distributed, possibly colloidally dispersed, layer of spirilla and fusiform bacilli, each mist speck being a veritable mat of organisms.

Since this spray can be readily felt on the face of the patient and the arms of the operator and is easily inhaled, etc., it is suggested that the dangers be observed and that colloidal methods of coagulation be used in the administration of chemicals as well as a means of physicomechanically grouping and removing the organisms and that an alkalizing detoxicant be used as a prophylactic in the early treatment of this disease, the spray being abandoned.

A definite tendency exists in these cases to give a little palliative treatment, a slap on the shoulder and advice not to worry. Months and often years of quiescence, clinically, follows with little reaction by the patient as a whole, but with bacilli observed microscopically. Spirilla are present in large numbers without clinical signs. This, combined with certain community customs, beliefs, etc., wherein contacts are very direct, precedes another outbreak of the disease. We are left merely touching the high spots with our chemicals, seldom dealing with the causes.

The chief handicap in the recognition and treatment of Vincent's infection may be considered general indifference. The entire process tends to go on as a general nuisance and a threat to the health of the community. We have observed the organisms and the clinical manifestations of this disturbance. We know the relationship between these to exist. The same organisms are occasionally observed in relation to the genito-urinary tract. Relationship also exists between this disease and certain conduct resulting in promiscuous contacts. On microscopic and colloidal levels, we have made very little investigation of Vincent's infection. It is suggested that early treatment consist of topical applications of the oxygen-yielding and alkalizing chemicals which can be carried deeply into the tissues.

Lang Building.

Allergy to Acetanilid

By G. Sidney Jacks, D.D.S., Chicago, Ill.

A man of middle age, rather deaf in both ears, had upper third molar extracted. One tablet of acetyl salicylic acid was recommended for postoperative relief. Overnight, extreme swelling of the face took place with the formation of large, white blotches, which later turned red. Itching and tenderness, attended by worry, prevented sleep. The swelling was gradually reduced after a twelve-hour period, and facial eczema disappeared completely on the following day.

Palliative treatment consisted of laxatives for the elimination of the toxin, large quantities of milk and other liquid foods and complete rest. Curiously enough, the patient had never complained of headaches or any nervous pains.

4125 West Montrose Avenue.

ANNOUNCEMENTS

ANNOUNCEMENTS must be received by the fifth day of the month in order to be published in the forthcoming issue of THE JOURNAL.

CALENDAR OF MEETINGS

AMERICAN ASSOCIATION OF DENTAL SCHOOLS, Philadelphia, March 15-17.

AMERICAN ASSOCIATION OF ORTHODONTISTS, Chicago, Ill., May 13-16.

AMERICAN BOARD OF ORTHODONTICS, Chicago, Ill., May 11.

AMERICAN COLLEGE OF DENTISTS, Baltimore, March 17.

AMERICAN DENTAL ASSISTANTS ASSOCIATION, Cleveland, Ohio, September 9-12.

AMERICAN DENTAL ASSOCIATION, Cleveland, Ohio, September 9-13.

AMERICAN PUBLIC HEALTH ASSOCIATION, Detroit, Mich., October 8-11.

AMERICAN SOCIETY FOR THE ADVANCEMENT OF GENERAL ANESTHESIA IN DENTISTRY, New York, N. Y., March 25.

AMERICAN SOCIETY OF ORAL SURGEONS AND EXODONTISTS, Cleveland, Ohio, September 6-7.

CLEVELAND DENTAL SOCIETY, April 8-9.

DENTAL CENTENARY, Baltimore, Md., March 18-20.

DISTRICT OF COLUMBIA DENTAL SOCIETY, second and fourth Tuesdays in each month from October to June at the United States Public Health Service Auditorium, Washington.

FIVE STATE POST GRADUATE CLINIC, Washington, D. C., May 19-23.

NATIONAL ASSOCIATION OF DENTAL ANESTHETISTS, New York, N. Y., March 26.

NATIONAL BOARD OF DENTAL EXAMINERS, May 6-7.

NATIONAL DENTAL ASSOCIATION, St. Louis, Mo., August 12-16.

OMICRON KAPPA UPSILON, Philadelphia, March 16-17.

PSI OMEGA, Baltimore, March 18.

SIGMA DELTA EPSILON, Baltimore, Md., March 15-17.

ST. LOUIS UNIVERSITY DENTAL ALUMNI ASSOCIATION, St. Louis, Mo., March 27-28.

WASHINGTON UNIVERSITY DENTAL ALUMNI ASSOCIATION, St. Louis, Mo., April 10.

WISCONSIN STATE DENTAL ECONOMIC STUDY CLUB, Madison, August 2-3.

XI PSI PHI, Baltimore, Md., March 18.

STATE SOCIETIES

April

Alabama, at Birmingham (9-11)
Arizona, at Tucson
Kansas, at Kansas City, Mo. (28-May 1)
Kentucky, at Owensboro (11-13)
Louisiana, at Monroe (18-20)
Massachusetts, at Boston (22-25)
Michigan, at Detroit (15-17)
Mississippi, at Jackson (15-17)
Missouri, at Kansas City (28-May 1)
Oklahoma, at Tulsa (14-16)
Texas, at Dallas (9-11)
Wisconsin (22-25)

May

Arkansas, at Little Rock (20-22)
California State, at Oakland (13-15)
District of Columbia, at Washington (19-23)
Georgia, at Macon (14-16)
Illinois, at Springfield (13-16)
Indiana, at Indianapolis (20-22)
Iowa, at Des Moines (6-8)
Montana, at Billings (2-4)
Nebraska, at Lincoln (20-23)
New Jersey, at Asbury Park (8-10)
New York, at Buffalo (14-17)
North Carolina, at Charlotte (6-8)
North Dakota, at Bismarck (5-7)
South Carolina, at Spartanburg (20-21)
South Dakota, at Sioux Falls (12-14)
Tennessee, at Memphis (13-16)
Vermont, at Burlington (15-16)
Virginia, at Lynchburg (13-15)
West Virginia, at Charleston (20-22)

June

Colorado, at Colorado Springs (20-22)

Connecticut, at New London (5-7)
Idaho, at Sun Valley (24-26)
Maine, at Lakewood (23-25)
Nevada, at Reno (8)
New Hampshire, at North Conway
New Mexico, at Santa Fe
Oregon, at Portland (12-15)
Pennsylvania, S. S. South American (13-16)
Utah, at Salt Lake City
Wyoming, at Rock Springs

August

Hawaii, at Honolulu

October

Southern California, at Los Angeles

November

Ohio, at Cincinnati

STATE BOARDS OF DENTAL EXAMINERS

Alabama, at Birmingham, June 24. W. A. Wood, 1004 Merchants National Bank Bldg., Mobile, Secretary.

Arkansas, at Little Rock, June 17-20. Clarence W. Koch, 817 Donaghey Bldg., Little Rock, Secretary.

California, at San Francisco, June 3, and at Los Angeles, June 24. Kenneth I. Nesbitt, 515 Van Ness Ave., San Francisco, Secretary.

Florida, at Jacksonville, June 24. H. B. Pattishall, 351 St. James Bldg., Secretary.

Indiana, at Indianapolis, June 4-7. J. M. Hale, Mt. Vernon, Secretary.

Kentucky, at Louisville, June 11-14. Leon M. Childers, 1312 First National Bank Bldg., Lexington, Secretary.

New Jersey, June 24-29. Walter A. Wilson, 148 W. State St., Trenton, Secretary.

North Carolina, at Raleigh, June 24. Wilbert Jackson, Rich Building, Secretary.

North Dakota, at Fargo, July 8-11. L. I. Gilbert, 401 Black Bldg., Fargo, Secretary.

Ohio, at Columbus, June 24-28. Morton H. Jones, 1553½ North Fourth St., Columbus, Secretary.

Oklahoma, at Oklahoma City, June 17-20. W. T. Longwell, Frederick, Secretary.

Pennsylvania, at Pittsburgh and Philadelphia, June 18-22. Reuben E. V. Miller, 61 North Third St., Easton, Secretary.

Texas, at Houston, June 17-21. B. Carl Holder, 1009 Nixon Bldg., Corpus Christi, Secretary.

Wisconsin, at Milwaukee, June 17-21. S. F. Donovan, Tomah, Secretary.

IDAHO STATE DENTAL ASSOCIATION
(Change of Dates)

THE date of the next meeting of the Idaho State Dental Association has been changed from June 23-25 to June 24-26.

L. E. SHAW, *Treasurer,*
Pocatello.

MISSISSIPPI DENTAL ASSOCIATION

THE next meeting of the Mississippi Dental Association will be held at Jackson at the Robert E. Lee Hotel, April 15-17.

GEORGE P. EVANS, *Secretary,*
Jackson.

MISSOURI-KANSAS DENTAL MEETING

THE Missouri-Kansas Dental Meeting will be held in the Municipal Auditorium, Kansas City, Mo., April 28-May 1.

ROY L. FELKNER, *Chairman of Publicity,*
Shukert Bldg.,
Kansas City, Mo.

BOARD OF DENTAL EXAMINERS OF ALABAMA

THE Board of Dental Examiners of Alabama will conduct its next annual dental examination in Birmingham beginning at 8:30 a.m., June 24. All credentials must be filed with the secretary at least two weeks in advance of the examination. Address all correspondence to

W. A. WOOD, *Secretary,*
1004 Merchants Nat'l Bank Bldg.,
Mobile.

ARKANSAS STATE BOARD OF DENTAL EXAMINERS

THE Arkansas State Board of Dental Examiners will conduct its next examination of applicants for dental licensure at Little Rock, June 17-20. All applications must be filed with the secretary not later than June 10.

CLARENCE W. KOCH, *Secretary,*
817 Donaghey Bldg.,
Little Rock.

FLORIDA STATE BOARD OF DENTAL EXAMINERS

THE annual examination for license to

practice dentistry and license to practice dental hygiene in Florida will be held in Jacksonville, commencing June 24, at the Seminole Hotel. Preliminary applications must be filed sixty days prior to date of examination. Address all communications to

H. B. PATTISHALL, *Secretary,*
351 St. James Bldg.,
Jacksonville.

GEORGIA DENTAL ASSOCIATION

THE seventy-second annual meeting of the Georgia Dental Association will be held at Macon, May 14-16, with headquarters at the Hotel Dempsey.

R. H. MURPHY, *Secretary,*
920 Ga. Gas Bldg.,
Macon.

INDIANA STATE BOARD OF DENTAL EXAMINERS

THE next examination for licensure of the Indiana State Board of Dental Examiners will be held in Indianapolis beginning Tuesday, June 4 and continuing for four days. All applications, fees and credentials must be in the hands of the secretary not later than ten days prior to the beginning date of the examination. For applications, instructions to candidates and other information, address

J. M. HALE, *Secretary,*
Mt. Vernon.

KENTUCKY BOARD OF DENTAL EXAMINERS

THE next examination of the Kentucky Board of Dental Examiners will be held June 11-14 in Louisville. Address all communications to

LEON M. CHILDERS, *Secretary,*
1312 First Nat'l Bank Bldg.,
Lexington.

NORTH CAROLINA STATE BOARD OF DENTAL EXAMINERS

THE next annual meeting of the North Carolina State Board of Dental Examiners will be held at the State Capitol, Raleigh, beginning June 24. Applications must be filed with the secretary thirty days before the examination. For application blanks and further information, address

WILBERT JACKSON, *Secretary,*
Rich Building,
Clinton.

NORTH DAKOTA STATE BOARD OF DENTAL EXAMINERS

THE North Dakota State Board of Dental Examiners will hold its next examination in the Gardner Hotel, Fargo, June 8-11. For information and application, address

L. I. GILBERT, *Secretary,*
401 Black Bldg.,
Fargo.

OHIO STATE DENTAL BOARD

THE next examination of the Ohio State Dental Board will be held at the College of Dentistry, Ohio State University, Columbus, the week beginning Monday, June 24. All applications must be in the hands of the secretary at least ten days before the date of examination. For further information, address

MORTON H. JONES, *Secretary,*
1553½ North Fourth St.,
Columbus.

BOARD OF GOVERNORS OF REGISTERED DENTISTS, STATE OF OKLAHOMA

THE Oklahoma Board of Governors of Registered Dentists will hold its next examination June 17-20, in Oklahoma City. Applications must be filed at least ten days before the date of examination. For information and application blanks, address

W. T. LONGWELL, *Secretary,*
Frederick.

DENTAL COUNCIL AND EXAMINING BOARD OF THE COMMONWEALTH OF PENNSYLVANIA

THE Dental Council and Examining Board of the Commonwealth of Pennsylvania will conduct examinations in Philadelphia and Pittsburgh, June 18-22. For information and applicant blanks, address the Department of Public Instruction, Bureau of Professional Licensing, Dental Division, Harrisburg, or

REUBEN E. V. MILLER, *Secretary,*
61 North Third St.
Easton.

TEXAS STATE BOARD OF DENTAL EXAMINERS

THE Texas Board of Dental Examiners will hold its next examination June 17-21, in Houston. Applications must be filed at

least ten days prior to date of examination. For further information, address

B. Carl Holder, *Secretary,*
1009 Nixon Bldg.,
Corpus Christi.

AMERICAN SOCIETY OF ORAL SURGEONS AND EXODONTISTS

The Twenty-Second Annual Meeting of the American Society of Oral Surgeons and Exodontists will be held in Cleveland, Ohio, September 6-7.

Harry Bear, *Secretary,*
410 Professional Bldg.,
Richmond, Va.

WISCONSIN STATE DENTAL ECONOMIC STUDY CLUB

The Wisconsin State Dental Economic Study Club will hold its tenth annual meeting at Madison, August 2-3.

A. C. Smiley, *Secretary,*
2028 Atwood Ave.,
Madison.

NATIONAL BOARD OF DENTAL EXAMINERS

The National Board of Dental Examiners will hold its next session May 6-7 in cities where there are five or more candidates. Application blanks and information pertaining to the examinations may be obtained from the secretary.

Morton J. Loeb, *Secretary,*
66 Trumbull St.,
New Haven, Conn.

DENTAL CENTENARY CELEBRATION

The one-hundredth anniversary of the founding of professional dentistry will be celebrated in Baltimore, Md., March 18-20.

Meyer Eggnatz, *Secretary,*
Medical Arts Bldg.,
Baltimore, Md.

CLEVELAND DENTAL SOCIETY

The Annual Spring Clinic Meeting of the Cleveland Dental Society will be held April 8-9 at the Statler Hotel.

Irwin F. Steuer, *Chairman,*
Publicity Committee,
562 Rose Bldg.,
Cleveland, Ohio.

NATIONAL DENTAL ASSOCIATION

The National Dental Association will hold its twenty-seventh convention, August 12-16 in St. Louis, through the cooperation of the local chapter, the Mound City Dental Society. For further information, address

J. A. Jackson, *Secretary,*
406 Commerce St.,
Charlottesville, Va.

NATIONAL ASSOCIATION OF DENTAL ANESTHETISTS

The next meeting of the National Association of Dental Anesthetists will be held Tuesday, March 26, at the Squibb Building Auditorium, New York, N. Y. At the scientific session at 8:30 p.m., Henry S. Ruth, M.D., Philadelphia, will speak on "New Developments in Anesthesia of Interest to the Dentist."

John B. Woodman, *Chairman,*
Program Committee.

DENTAL INTERNSHIP

Applications are now in order for appointment to a twelve-month internship, beginning July 1, at St. Luke's Hospital, Morningside Heights, New York, N. Y. The dental intern will be instructed in a wide variety of dental activities. Applications should be made as soon as possible, stating qualifications. In applying, address

Jerome M. Schweitzer, D.D.S.,
Chief of Dental Department.

WASHINGTON UNIVERSITY DENTAL ALUMNI ASSOCIATION

The Washington University Dental Alumni Association will hold its annual meeting at the dental school building, 4559 Scott Ave., St. Louis, April 10.

Leo M. Shanley, *Secretary,*
7800 Maryland Ave.,
St. Louis, Mo.

OMICRON KAPPA UPSILON
(Change of Dates)

The annual meeting of Omicron Kappa Upsilon previously announced for March 15 will be called March 16, at the Benjamin Franklin Hotel, Philadelphia, and, in order to comply with the request of the Centennial Celebration Committee, will adjourn to Baltimore March 17 for luncheon and meeting.

George W. Teuscher, *Secretary,*
Ward Memorial Building,
311 E. Chicago Ave.,
Chicago, Ill.

ST. LOUIS UNIVERSITY DENTAL ALUMNI ASSOCIATION

THE St. Louis University Dental Alumni Association will hold its annual reunion March 27-28, at the Dental School Building, 3556 Caroline St., St. Louis.

PAUL F. O'BRIEN, *Chairman,*
Press & Publicity Committee,
Missouri Theatre Building,
St. Louis, Mo.

SIGMA EPSILON DELTA

IN conjunction with the celebration of the National Dental Centenary in Baltimore, Sigma Epsilon Delta will hold its annual convention, March 15-17, the three days preceding the Centennial.

DAVID P. FRUCHTBAUM,
Chairman of Publicity,
4664 Park Heights Ave.,
Baltimore, Md.

EXAMINATION FOR APPOINTMENT IN THE DENTAL CORPS OF THE NAVY

A COMPETITIVE examination to select not more than twenty for appointment in the Dental Corps of the Navy will be held July 8 at the Naval Medical School, Washington, D. C.; Naval Training Station, Great Lakes, Ill., and Naval Training Station, San Diego, Calif. A candidate for appointment in the Dental Corps must be a citizen of the United States, between 21 and 32 years of age at the time of appointment and a graduate of a standard dental college. A circular which contains full information relative to the Dental Corps and describes the method of making application for appointment can be obtained from the Bureau of Medicine and Surgery, Navy Department, Washington, D. C.

POSTGRADUATE COURSES, NEW YORK UNIVERSITY COLLEGE OF DENTISTRY

Periodontia

Seventh Annual Postgraduate Course

Schedules: A. June 17-28, morning and afternoon sessions.

B. June 17-July 10, morning and afternoon sessions for the first three days and morning sessions only thereafter.

Tuition: $100. The enrolment is limited to fifteen.

Content: The course will include etiology; pathology; diagnosis; prognosis of periodontal disease; equilibration of occlusion; gingival massage; instrumentation, stressing conservative treatment; Vincent's infection; drugs; maintenance of mouth health; prevention, etc., taught by lectures and practical work at the chair, each student handling his own cases. Consideration will be given to all types of treatment, their indications and limitations.

Full Denture Prosthesis

Schedule: May 31-June 28, Fridays, 1:00-7:00 p.m.

Tuition: $100. Class limited to four men per instructor.

Content: Each student is assigned an edentulous case. After patient instruction and diagnosis, closed mouth impressions are taken under centric biting pressure. The bite relation is established by means of wax check bite. The teeth are set up and balanced and ground to harmonize with the condyle readings.

Fixed Bridge Construction

Schedules: May 20-June 15, morning sessions, including Saturday.

May 20-June 1, full-day sessions, including Saturday morning.

Tuition: $100. Class limited to sixteen members.

Content: This course will deal purely with the principle of complete fixation for stabilization of all fixed bridges, covering by means of lectures, lantern slides and motion pictures the following subject matter in detail: diagnosis, principle of parallelism, treatment planning, cavity preparation and pontic construction.

For further information concerning these courses, write to:

The Office of the Dean,
New York University,
College of Dentistry,
209 East 23d Street,
New York, N. Y.

POSTGRADUATE COURSES AT THE UNIVERSITY OF PENNSYLVANIA

THE School of Dentistry of the University of Pennsylvania offers the following special postgraduate courses:

1. Ten-day course in oral surgery, roentgenology, exodontia and local and general anesthesia, consisting in part of lectures on the subjects, supplemented by lectures and demonstrations in anatomy, bacteriology and pathology, as they pertain to the clinical subjects. Most of the time will be spent in clinical instruction at the Evans Institute and at various hospitals.

Time: Monday, May 20, to Thursday, May 30. Fee: $75, $25 to be sent with application and $50 payable at the time of registration at the school.

2. Four-day general refresher course, including nearly all clinical subjects in the curriculum. Subjects will be arranged so as to permit considerable latitude in selection of subjects to be taken. Complete details will be announced later.

Time: Monday, June 3, to Thursday, June 6. Fee: $10, payable in advance. Applicants for either of these courses should state their school and class and dental society affiliation. They are not restricted necessarily to University of Pennsylvania graduates, but alumni will be given preference in case the numerical limits are exceeded. Application should be made to

The Dean,
School of Dentistry,
University of Pennsylvania,
Evans Institute,
40th and Spruce Sts.,
Philadelphia, Pa.

NATIONAL BOARD OF DENTAL EXAMINERS

At the last session of the National Board of Dental Examiners, held December 4 and 5, the following candidates were successful in passing Part II:

University of Pennsylvania
William Guth Schiff
George A. Zurkow
University of Iowa
John Meierkord
Northwestern University
Davis Henderson
St. Louis University
Allan Louis Springer
Atlanta-Southern
Donald H. Moon
New York University
Nathan Peck
University of Nebraska
Donald Todd Waggener
Temple University
Norman Oliver Harris

Sessions were held in the following places: Boston, Chicago, New York, Philadelphia, Iowa City, St. Louis, Baltimore, Atlanta and Rochester (Minn.).

There were eleven successful candidates who participated in Part I. The next session of the Board will be held on May 6 and 7.

Morton J. Loeb, *Secretary*,
66 Trumbull St.,
New Haven, Conn.

THIRD ANNUAL MILITARY MEDICO-DENTAL TRAINING COURSE

The Third Annual Military Medicodental Training Course at Chicago for Medical Department Reserve Officers will be held by the Sixth Corps Area during the period March 31 to April 13, according to an announcement made today by Lieut. Gen. Stanley H. Ford, commanding the Sixth Corps Area.

This course, which will be conducted under the direction of the Corps Area surgeon, Col. Paul W. Gibson, Medical Corps, with the cooperation of the Medical and Dental schools of the University of Illinois, University of Chicago, Loyola University and Northwestern University, is designed to increase the military and professional proficiency of reserve officers of the Medical, Dental, Veterinary and Medical Administrative Corps. The morning hours will be devoted to professional work in the schools, hospitals and clinics connected with the participating universities. The afternoon and special evening sessions will be devoted to problems connected with the operation and functioning of the medical service in war. The military courses for the current year will be especially concerned with problems of mobilization as they affect the Medical Department of the Army.

Previous courses of this type, conducted in Chicago in 1938 and 1939, met with a most enthusiastic response on the part of those individuals participating in the instruction. Members of the profession who are officers of the Dental Reserve Corps and interested in attending this course should communicate with the Surgeon, Sixth Corps

Area, Room 1040, U. S. Post Office Building, Chicago, Ill.

AMERICAN BOARD OF ORTHODONTICS

A MEETING of the American Board of Orthodontics will be held at the Edgewater Beach Hotel, Chicago, May 11. Orthodontists who desire to qualify for certificates from the board should secure the necessary application blanks from the secretary. The applications must be returned to the secretary, together with any other required credentials, prior to the date of examination. Applications filed at the time of the board meeting will have preliminary consideration, so that the applicant may be advised of the work required for his subsequent examination. Attention is called to the following resolutions adopted by the board: Any person desiring to make application to the board for a certificate must have been in the exclusive practice of orthodontics for a period of not less than five years or an equivalent to be determined by the board and based upon the following conditions: 1. He must be an instructor in orthodontics in a school satisfactory to the board. 2. He must be the associate in the office of an orthodontist whose standing is satisfactory to the board. 3. It is to be definitely understood that any person at the time of making application for a certificate shall be in the exclusive practice of orthodontics in his own name. For further information, address

CHARLES R. BAKER, *Secretary,*
636 Church St.,
Evanston, Ill.

UNITED STATES PATENTS APPLICABLE OR PERTAINING TO DENTISTRY ISSUED DURING DECEMBER 1939

December 5

No. 2,182,041, to ARTHUR SZABO. Alloy.
No. 2,182,525, to WILLIAM A. MAY. Device for holding dental floss.
No. 2,182,742, to WILLIAM BREWER. Spraying apparatus for dental, medical and like purposes.
No. D-117,989, to GORDON K. CAMERON. Design for a dental lathe.

December 12

No. 2,182,822, to JACOB A. SAFFIR. Apparatus for dental projection.
No. 2,183,353, to MISCHA KROOP. Artificial teeth and encasement therefor.
No. 2,183,415, to JOHN A. THOMMES. Power driven rotary toothbrush and the like.
No. 2,183,512, to GEORGE P. BRENNER. Fitting artificial dentures.
No. D-118,073, to STANLEY M. GOWER. Design for a toothbrush handle.

December 19

No. 2,183,690, to BERNARD S. OSTROM. Dental instrument.
No. 2,184,105, to STANLEY L. STEINER. Dental instrument.
No. 2,184,152, to JACOB A. SAFFIR. Ampoule.
No. D-118,142, to GLENN E. WILLHELMY. Design for a nasal inhaler.
No. D-118,155, to CYRIL M. BOSAK. Design for a toothbrush.

December 26

No. 2,184,850, to MORRIS SCHLOSS. Mechanical toothbrush.
No. 2,184,977, to ARCHIBALD MARTIN. Artificial tooth holder.
No. 2,186,067, to JUSTIN G. SHOLES. Apparatus for self-administration of anesthetics.
No. 2,185,068, to JUSTIN G. SHOLES and ORIS J. SMITH. Apparatus for self-administration of anesthetics.
No. 2,185,069, to JUSTIN G. SHOLES and JOHN T. GLEKLER. Anesthetic apparatus.
No. D-118,268, to JONAL SALIT. Design for a toothbrush.